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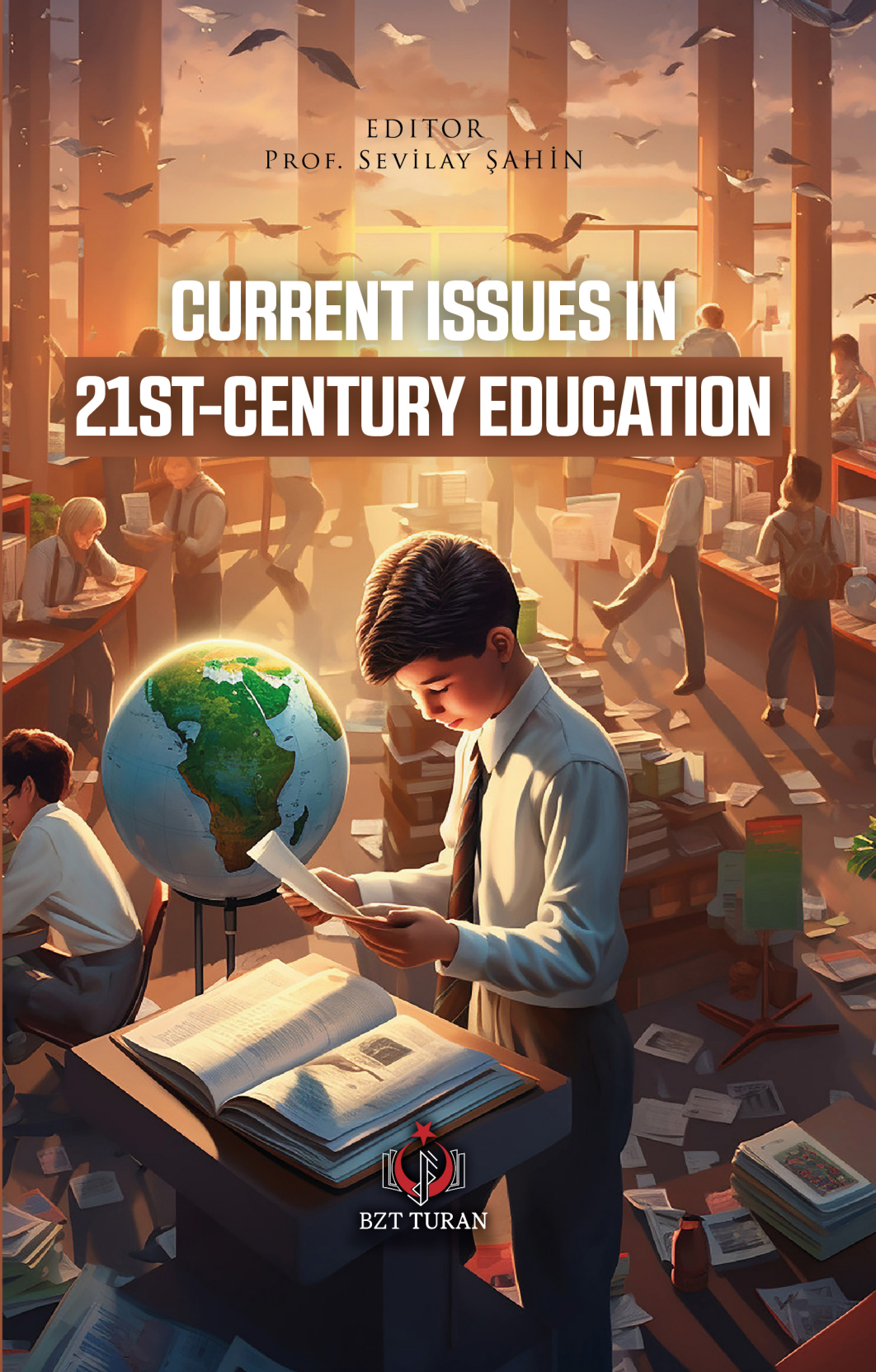
CURRENT ISSUES IN 21ST-CENTURY EDUCATION



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CURRENT ISSUES IN 21ST-CENTURY EDUCATION

EDITOR
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Prof. Dr. Sevilay Şahin graduated from Hacettepe University, Department of English Linguistics in 1989. She completed her Master's Degree in 1992 and her PhD in 1998 at Gaziantep University, Institute of Educational Sciences. She began her academic career at Gaziantep University, where she has served for many years in the Faculty of Education, Department of Educational Sciences, conducting extensive research in the field of educational administration. Her research focuses on educational administration, leadership, supervision, and teacher training and Professional development. She has made significant contributions to the academic literature through numerous national and international publications. Her articles have been published in journals indexed in SSCI, ESCI, and Scopus, and she has also contributed to the field through books and book chapters. In addition, she has participated in and managed various national and international research projects, particularly those focusing on innovative approaches in education, teacher training, and projects aimed at disadvantaged groups.

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Preface

Education systems are undergoing a profound transformation in line with the rapidly changing social, technological and global dynamics of the 21st century. In this transformation, it has become essential to shed light on the processes by which teachers, school leaders and policymakers adapt to this changing world. Today, education goes beyond the mere transfer of knowledge, necessitating the development of multi-dimensional skills such as critical thinking, awareness of rights, sustainability awareness and lifelong learning. In this context, the present volume aims to contribute to the field by bringing together current and original research that addresses this multidimensional transformation from various perspectives, offering significant contributions both theoretically and in terms of practical application.

The studies included in the book shed light on different focal points within the educational sciences. In the first study in the book, a document analysis of research on critical thinking highlights trends, methodological limitations and areas for development within the field, particularly in the context of teachers and school leaders; it argues that priority should be given to the critical thinking-focused professional development of school leaders in order to foster a systematic culture of critical thinking within educational institutions. Another study examines the role of primary school teachers in the development of pupils' abilities to recognise, protect and defend their rights, assessing the importance of a rights-based approach to education as an essential requirement. In another significant study, the relationships between teachers' professional learning processes, perceptions of self-efficacy and organisational learning were examined; it was concluded that professional development initiatives must be approached by considering the comprehensive and supportive role of these three themes. In a significant study grounded in theoretical approaches, the book demonstrates that the transformation in educational sciences is not merely a pedagogical change, but a multi-layered process deeply intertwined with social, cultural and technological developments. Another study, which evaluates the mathematics curriculum from the perspective of Realistic Mathematics

Education, offers a significant perspective that questions how educational policies are reflected in classroom practices. Another study examining the effectiveness of a game-based application aimed at developing sustainability awareness demonstrates that innovative teaching approaches make significant contributions to students' cognitive and affective development, encourage their active participation in learning processes, and help them internalise sustainable development goals through a sense of social responsibility. The final study in the book examines the impact of teachers' perceptions of work autonomy on leader teacher behaviours, demonstrating that teachers' autonomy within educational institutions enhances this behaviours and leads them to assume a relatively active role in teaching and learning activities.

This book addresses a wide range of educational topics, providing a comprehensive resource for researchers, teachers, school leaders and policymakers. Given the ever-changing nature of education, it is our greatest hope that these studies will lay the groundwork for new discussions and guide practice.

We would like to thank all the researchers who contributed to the creation of this work and wish readers an inspiring reading experience.

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CHAPTER 1

Document Analysis of Studies on Critical Thinking With Teachers and School Administrators

Sevilay ŞAHİN[1]

Merve KISAOĞLU[2]

Abstract

In response to growing global emphasis on critical thinking (CT) as a key educational competency, this study examines critical thinking research focused on teachers and school administrators within Turkish education, aiming to assess the field's current empirical and methodological scope. Using document analysis on 93 studies (35 articles, 45 master's theses and 13 doctoral dissertations) published from 2018 to 2023, the study categorizes research paradigms, methods, and findings to identify trends and gaps in CT-oriented educational research. Results show that quantitative research methods, particularly survey-based models, are most prevalent, with mixed-method and qualitative studies used less frequently. Teachers were the primary focus group, while school administrators were underrepresented despite their role in fostering CT in educational environments. Key findings reveal that high CT skills correlate with enhanced teaching quality, classroom engagement,

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and organizational health. However, significant gaps exist in structured CT training for educators and in-depth methodologies. Recommendations include integrating CT into teacher training programs and prioritizing CT-focused leadership development for administrators to promote a systemic critical thinking culture across educational roles. This study highlights the urgent need for diverse research methodologies to deepen understanding and application of CT in Turkish education.

Key Words: Critical thinking, Teacher, School administrator.

Introduction

Critical thinking is a kind of thinking system based on its origins on the ideas of Socrates; it is explained as individuals being aware of their own thinking processes, questioning themselves and their surroundings, diligently seeking the truth. Acquiring critical thinking skills is considered crucial to live in this century. Critical thinking, as mentioned in the "Inclusive Life Skills Framework" published by UNICEF (2017), is described as individuals having knowledge of individual rights, self-awareness, and self-respect. Similarly, critical thinking, which is among the "Transferable 12 Skills from the Conceptual and Programmatic Framework" published by UNICEF (2022), is defined as a thinking system that expands our view and helps us understand that there are many aspects to be questioned and thought about behind what seems obvious; it is explained as the ability to ask questions, identify assumptions, and evaluate truths. In addition, UNESCO (2020) defines critical thinking from different perspectives: intentional, purposeful, and reflective thinking. Based on these definitions, it can be said that critical thinking is one of the necessary life skills in our age. Thus, it is positeed that individuals need to be involved in a systematic intervention to acquire critical thinking skills throughout their lives. These systematic interventions are often initiated in schools (Baki, 2022; Bozpolat & Kurga, 2021; Demirbilek & Kırbaç, 2021; Dilmaç, 2020; Durukan & Satılmış, 2021; Kandemir & Eğmir, 2020; Özyurt & Bezirgân, 2019; Tetik & Kandır, 2022; Şenyıldız, 2020; and Yeşil & Kıncal, 2019).

Many studies indicate that students with high critical thinking skills tend to have higher academic achievements and/or other life skills (such as reasoning, problem-solving, taking responsibility, collaboration, and openness to different perspectives). (Fitriani, Zubaidah & Hidayati, 2022; Gerdts-Andresen, Hansen & Grøndahl, 2022; Ma, Zhang & Lou, 2021; Roberts, 2020; Samaras, Adkins & White, 2021; Walsh, Lewandovski & Holmes, 2022; Walsh et al., 2019; Wu, 2020; Wulandari, Prayitno & Maridi, 2022). On the other hand, the ability of teachers to think critically, show behaviors associated with critical thinking

skills, and the methods and techniques they choose in educational practices, directly and indirectly, shape students' outcomes (Arsih, Zubaidah, Suwono & Gofur, 2021; Bădescu & Stan, 2020; Behairy, 2017; Boonjeam, Tesaputa & Sri-ampai, 2017; Clark & Paulsen, 2016; Danday & Monterola, 2019; Hegazy et al., 2021; Jones, 2020; Low, Hui & Cai, 2017; Mark, 2015; Parsi, 2017; Michelot, Béland & Poellhuber, 2022; Nettlefold & Williams, 2021; Wan, Yao, Li & Bi, 2023; Zhou et al., 2012). In line with this, like teachers, school administrators need to be able to think critically and organize educational environments. The role of school administrators is crucial in designing an educational environment based on critical thinking (Henriksen & Aas, 2021; Kısaoğlu, 2022; Özgenel, 2018; Polka, 2022; Sudana & Apriyani, 2018). For this role, it is believed that school administrators should possess critical thinking knowledge and its application, analysis, synthesis, and evaluation. The administrator should be able to plan tasks and think metacognitively, systematically, and analytically in problem- solving situations; rely on evidence-based facts when making decisions; be open to views and opinions from stakeholders; and be innovative in educational and management practices within the school. School administrators should also be able to think flexibly when faced with opposing ideas to their own judgments, interpret media content accurately, possess the cognitive maturity to establish humane and social relationships, and demonstrate the technological and digital skills required by the 21st century.

At the root of critical thinking is scientific and methodical thinking. The same situation lies at the basis of scientific research. Therefore, examining scientific research on critical thinking. It is crucial for education to emphasize once again the way research is conducted and the results they produce holistically. In recent years, there have been many studies conducted on critical thinking skills with teachers and school administrators in the Turkish education context. As mentioned above, in an area that has attracted many researchers worldwide, it is considered crucial to examine the studies from various perspectives, understand what they focus on, and identify areas for further exploration. To highlight its relevance, research conducted in the national literature has been examined using document analysis under predefined themes. Thus, an attempt has been made to present a picture of critical thinking concerning teachers and school administrators. In this context, this study aims to reveal the paradigms, participant groups, methods/designs, findings, and recommendations of studies on critical thinking with teachers and school administrators conducted between 2018 and 2023. Additionally, the study aims to underscore the importance of critical thinking for our education system and the need for critical thinking.

Method

Researchers determine both the method and the interpretation of reality using paradigms that are close to their philosophical perspectives during the pursuit of truth (Poni, 2014). In other words, the process of obtaining desired knowledge and the process of interpreting it are closely related to adopted paradigm. In the current study, the researcher operates under the assumption of multiple realities rather than a single truth, and believes that it is important to reveal meaning. Therefore, the predominant approach in this study is the interpretivist paradigm, in which a qualitative/subjective perspective predominates in the analysis and interpretation of the data. However, a quantitative perspective has also been utilized to provide a broader overview (e.g., giving some percentage values). In this study, the document analysis method, which is less commonly used in qualitative research compared to others (Özer Özkan & Şenyurt, 2017), was used because, similar to other methods in qualitative research, document analysis requires the analysis and interpretation of data to reveal meaning and foster understanding (Bowen, 2009). Document analysis allows the use of theses, books, or articles published within a certain time frame as the unit of analysis in educational research (Sak et al., 2021), providing advantages in terms of individuality and originality by allowing the researchers to determine the boundaries of their study as they wish (Corbetta, 2003; as cited in Kıral, 2020).

While Forster (1994) categorizes document analysis into five stages, Merriam (2009), Altheide and Schneider (2017), and O'Leary (2017) categorize it into four stages (as cited in Sak et al., 2021); Fitzgerald (2012) categorizes it into ten stages. Following Fitzgerald's stages of document analysis, this study formed the following research design.

1.Research Design

Tablo A. *Diagram of steps followed in document analysis*

The defining or presenting of the research problem or topic	Studies on critical thinking with teachers and school administrators were determined as the subject of this research topic.
Determining the aim and research questions of this study	This study aimed to reveal the following aspects of the studies conducted on critical thinking with teachers and school administrators between 2018-2023: ● Their paradigms ● Participant groups ● Methods and designs ● Findings and recommendations Furthermore, this study sought to highlight the importance of critical thinking for the education system and to identify the need for critical thinking.
Determining the relevant theoretical and methodological framework	● The framework concerning the research topic: Studies related to critical thinking involving teachers and school administrators/school principals were determined. ● The framework related to the dates of the documents to be examined in this research: Studies conducted between 2018 and 2023 were determined. ● The framework regarding the database for literature review: Documents were searched in ULAKBİM and YÖKTEZ.
Selecting keywords or themes from the literature	"The critical thinking" words were chosen as key terms.
Acquisition of physical and electronic documents	Articles and theses relevant to the research problem reached through the selected keywords were identified as documents.
Classification of documents	The documents accessed were classified as follows: ● Theses o Master's theses o Doctoral dissertations ● Articles
Collection and organization of data	The classified data were arranged chronologically.
Formation of themes from the data (or data being addressed within the framework of themes)	Themes related to the aim of this research were identified as follows: ● Paradigms of the studies ● Participant groups of the studies ● Methods and designs of the studies ● Findings and recommendations of the studies

Interpretation of research questions based on the obtained data and themes	The data grouped under the relevant theme was interpreted based on the literature.
Structuring and writing the report	The studies were comprehensively addressed, and a final report was written.

2.Data Collection

Out of 287 articles on "Critical Thinking" published in ULAKBİM between 2018 and 2023, those outside the scope of this study (such as those in health, communication, business, and sports fields, and those involving students and prospective teachers in the field of education) were excluded from this study. Thirty-five articles, 45 master's theses and 13 doctoral dissertations under the title of critical thinking within the research framework were included (Theses focuses on book reviews, health, communication, business, and sports fields, and theses conducted with students and teacher candidates in the field of education, as well as theses for which only abstracts were available in the database, were not included in the study. Documents were accessed between March 1-30, 2023.)

Table B. *Scientific researchs analyzed in document analysis*

Units of Analysis	Document Counts	Reasons for Including Documents in the Research
Articles	35	Because of having the sample and participant groups consisting of teachers and school administrators.
Master's Theses	45	
Doctoral dissertations	13	

3.Data Analysis

In data analysis the documents are analysed in terms of comprehensive (addressing the topic entirely or generally) or selective (covering only some aspects of the topic) (Bowen, 2009). The themes of "Paradigms of the studies," "Participant groups of the studies," and "Methods and designs of the studies" data were analyzed comprehensively because the data in each section remained consistent (e.g., the participant group of a study remain the same at the beginning and end of an article). In the fourth theme, "Findings and recommendations of the studies," data were analysed selectively because of focusing only on

certain aspects of the research objective. Codes were created for each theme, and the coding process was completed.

The documents were analyzed using content analysis method within the framework four themes. Content analysis can be diversified into basic content analysis, interpretive content analysis, and qualitative content analysis (Drisko & Maschi, 2016). Basic content analysis entails pre-determined keywords or codes that researchers look for. The coding process aims to find these keywords or codes. Therefore, basic content analysis was used in the first, second, and third themes (Paradigms of the studies, Participant groups of the studies, and Methods and designs of the studies). For these themes, the In Vivo coding method defined as coding the language found in qualitative data records, such as words and short phrases (Strauss, 1987, as cited in Saldana, 2022), was used.

In the fourth theme (Findings and recommendations of the studies), an interpretive content analysis approach was adopted. Interpretive content analysis involves inferring from the content (symbols, references) and using them as evidence. In other words, researchers go beyond counting words or codes in interpretive content analysis. It is qualitative rather than statistical, allowing for understanding explicit and implicit content (Drisko & Maschi, 2016). The In Vivo coding and the Holistic Coding methods were used in this theme. In holistic coding, instead of analyzing the data line by line, analyzing the data holistically; there are no length restrictions on the assigned data, and the analyzed data unit can be as small as half a page or as large as the entire study (Saldana, 2022). In this framework, the holistic coding method reveals the underlying meaning beneath the apparent in association with interpretive content analysis.

4.Validity and Reliability

To ensure validity and reliability in this study, documents were selected based on whether their content aligns with the conceptual framework of this study, and appropriate documents were chosen to determine their accuracy and representativeness (Bowen, 2009). Following Altheide's (1996) principle that if another analyst reaches the same general conclusion when given the opportunity to analyze the same documents under similar conditions, the analysis is considered 'reliable' (cited in Wach, 2013), another expert researcher analyzed the documents, and similar results were obtained.

Textbooks, scientific publications, and institutional documents written by experts in the field can provide reliable and systematic data. Thus, using such documents and similar ones in qualitative studies enhances the validity and reliability of research (Saldana, 2011). In this context, the validity and

reliability of the current study were attempted to be enhanced by examining articles, master's theses, and doctoral dissertations within the scope of the study.

As in other research methods, ensuring validity and reliability in document analysis requires adherence to research standards and ethical principles (Sak et al., 2021). Extensive readings were conducted to understand the nature and scope of the document analysis method. By adhering to the research design selected for document analysis (Fitzgerald, 2012), efforts were made to maintain standards. Regarding ethics, since this study was not experimental or clinical research, no consent was obtained from any institution or participant. Following other ethical principles, the findings related to the selected themes as the unit of analysis were accurately reported in the documents included in this study. Additionally, all analyzed documents were appended to the sources.

The validity and reliability of qualitative data are primarily dependent on the methodological skills, sensitivity, and education of the evaluator (researcher) (Labuschagne, 2003). Before and throughout this study, the researcher read books and publications on qualitative research, including Michael Quinn Patton's "Qualitative Research & Evaluation Methods," Johnny Saldaña's "The Coding Manual for Qualitative Researchers," Corrine Glesne's "Becoming Qualitative Researchers,"

"Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research" and "Fundamentals of Qualitative Research: A Practical Guide."

5.Researcher's Role

In this study, the researcher acknowledges being axiologically loaded. While aware of the disadvantages of qualitative research, the researcher believes in the strength of the qualitative method and its success in reflecting reality. Moreover, the researcher believes that "Critical Thinking," the subject of the study, is a phenomenon that should be prioritized and studied extensively in our education system. Regarding the nature of qualitative research, the researcher thinks that reality is constructed concerning events and situations. In this study, the researcher took on the role of setting aside assumptions and biases during data collection and analysis. In the conclusion, discussion, and reporting sections, the researcher assumed the role of reflecting on their value judgments and interpretations.

Findings

1.Theme 1: Paradigms of the Studies

When forming the scientific framework of research, it is critical to determine the philosophical underpinnings and the paradigm through which the scientific perspective is approached. It is believed that attention should be paid to the adopted paradigm and the appropriate method and design for the subject and that this should be included in research as knowledge. In the researcher's study, it can be stated that providing information about how reality is perceived ontologically, what is considered knowledge epistemologically, and the role of values axiologically is a scientifically correct decision. This is because expressing our philosophical thoughts convey a message about what meaning is attributed to the research, what value is attributed, and how it is based on a scientific/conceptual foundation. Moreover, it is believed that having a paradigm for the research and especially expressing it guides the reader.The documents included in this research were analyzed within the framework of the theme "Paradigms of the Studies." According to the analysis results, references to the approach adopted or the paradigm taken in the studies were found in 3% of the articles, 16% of the master's theses, and 31% of the doctoral dissertations.

1.1.Findings regarding the Paradigms of ULAKBİM Documents/Articles

Table 1. *Codes related to the paradigms of studies scanned in ULAKBİM*

No	Codes
1.	Quantitative paradigm (1)

Upon reviewing Table 1, it becomes apparent that among the 35 documents included in our investigation from the articles scrutinized in ULAKBİM regarding critical thinking, only one document explicitly delineates the adopted approach and the paradigm under which the study was conducted.

1.2.Findings Regarding the Paradigms of Studies in YÖKTEZ Master's Documents

Table 2. *Codes related to the paradigms of studies in MA documents scanned in YÖKTEZ*

No	Codes
1.	Quantitative approach (2)
2.	Quantitative and qualitative paradigm (3)
3.	Exploratory qualitative research (1)
4.	Interpretive paradigm (1)

Upon examining the relevant table, it was observed that out of the 45 documents of master's theses focuses on critical thinking included in our research and scanned in YÖKTEZ, only seven mentioned the approach adopted in their studies and the paradigm under which this research was conducted. It is notable that the "Quantitative and qualitative paradigm" was mentioned more frequently compared to others. It was seen that "Quantitative approach" was chosen in two studies, "Exploratory qualitative research" in one study, and "Interpretive paradigm" in another study.

1.3.Findings regarding the Paradigms of Studies in YÖKTEZ Doctoral Documents

In the doctoral dissertations on critical thinking scanned in YÖKTEZ and included in our research, four documents indicate the approaches adopted in this research and the paradigmatic perspective taken. Only one of the documents contained a section titled "Researcher's Role." As shown in Table 3 below, it can be observed that in one of the doctoral dissertations, "Social Constructivism" was specified as the paradigm, while in three of them, "Quantitative and Qualitative Approach" was indicated.

Table 3. *Codes related to the paradigms of studies in Ph.D. documents scanned in YÖKTEZ*

No	Codes
1.	Social constructivism (1)
2.	Quantitative and qualitative approach (3)

2.Theme 2: Participant Groups in the Studies

In the context of the theme of participant groups, it was observed that in the analyzed articles, 3% only included school administrators, 3% included both teachers and school administrators as participant groups, and 94% focused exclusively on teachers. In terms of master's theses, 9% involved school administrators, 4% included both teachers and school administrators, and 87% focused exclusively on teachers. In all doctoral dissertations, 100% of the participants were teachers.

2.1.Findings regarding Participant Groups in ULAKBİM Documents

Table 4. *Codes related to the theme of participant groups in documents scanned in ULAKBİM*

No	Codes
1.	Teachers of different branches (6)
2.	Social studies teachers (2)
3.	Primary School teachers (4)
4.	Preschool teachers (6))
5.	Science center teachers (2)
6.	Primary-secondary-high school teachers (3)
7.	Primary-secondary-high school teachers and administrators of inclusive education schools (1)
8.	High school teachers (1)
9.	Primary and middle school teachers (1)
10.	Turkish language teachers (1)
11.	Biology teachers (1)
12.	Mathematics teachers (2)
13.	Religious Culture and Moral Knowledge teachers (3)
15.	Science teachers (1)
16.	School administrators (1)

As shown in Table 4, regarding the participant groups in the articles, it was observed that teachers from different branches and educational levels predominantly participated in the studies. In one study, school administrators participated along with teachers, and in only one study, school administrators were included as the participant group.

2.2.Findings on the Participant Groups in YÖKTEZ Master's Thesis Documents

It was observed that in four studies, only school administrators were included as participants; in two studies, teachers and school administrators were included, while in other studies, teachers were the participant group (see Table 5,9. The analysis revealed that teachers from various disciplines frequently participated in studies on critical thinking. The number of studies in which school administrators participate was comparatively lower.

Table 5. *Codes related to the theme of participant groups in MA documents scanned in YÖKTEZ*

No	Codes
1.	Primary School Teachers (7)
2.	Secondary school teachers (1)
3.	Primary-secondary-high school teachers (2)
4.	High school teachers (1)
5.	Biology teachers (1)
6.	History teachers (1)
7.	Geography teachers (1)
8.	Science teachers (1)
9.	Science Education teachers (2)
10.	Social studies teachers (2)
11.	Teachers of different branches (3)
12.	Preschool teachers (5)
13.	Mathematics teachers (2)
14.	English language teachers (2)
15.	Religious Culture and Moral Knowledge teachers (1)
16.	Religious Culture and Moral Knowledge teachers and Imam-Hatip Vocational Course teachers (1)
17.	Primary and secondary school teachers (1)
18.	Turkish language teachers (3)
19.	Information Technologies teachers (1)
20.	Tourism teachers (1)
21.	Philosophy teacher (1)
22.	Primary school teachers and administrators (1)
23.	High school teachers and administrators (1)
24.	Preschool administrators (1)

25.	School administrators from different levels of education (1)
26.	High school administrators (2)

2.3.Findings on Participant Groups in YÖKTEZ Doctoral Documents

As shown in Table 6, it was observed that in all of the doctoral thesis documents included in our study, teachers participated as the participant group. However, school administrators did not participate as participants at all.

Table 6. *Codes regarding participant groups in Ph.D. documents scanned in YÖKTEZ*

No	Codes
1.	Primary school teachers (1)
2.	Biology teachers (2)
3.	Religious Culture and Moral Knowledge teachers (2)
4.	Pre-school teachers (1)
5.	Social studies teachers (1)
6.	Science center subject teachers (1)
7.	Science center English language teachers (1)
8.	Science teachers (1)
9.	English language teacher (1)
10.	Subject teachers (1)
11.	Primary and secondary school teachers (1)

3.Theme 3: Methods and Designs of the Studies

In the theme selected as the unit of analysis, "Methods and Designs of the Studies," the documents were analyzed. In articles, 34% employed qualitative methods, 57% used quantitative methods, and 9% utilized mixed methods. Among master's theses, 16% employed qualitative methods, 60% used quantitative methods, and 24% utilized mixed methods. In one master's thesis, the method section was not provided under a separate heading, but it was understood that the document analysis method was employed. Among doctoral dissertations, 23% used qualitative methods, 23% employed quantitative methods, and 54% utilized mixed methods.

3.1.Findings on Methods and Designs of the Studies in ULAKBİM Documents

The documents included in our study were analyzed within the framework of the theme "Methods and Designs of the Studies." The analysis revealed a predominant preference for quantitative methods. Following quantitative methods, qualitative methods were chosen, while mixed methods were the least selected. However, in some of the examined documents, although the method was specified, the design was not. In some studies, relational, general, descriptive survey, or only survey designs were mentioned without specifying the method used. In some cases, after specifying the quantitative method, it was indicated that a survey model/design was selected. In qualitative and mixed method research, on the other hand, it was observed that information regarding the method and design is clearly stated.

Table 7. *Codes related to the theme of methods and designs of the studies in documents scanned in ULAKBİM*

No	Codes
1.	Qualitative/Descriptive survey (1)
2.	Qualitative/Descriptive survey + Case study (1)
3.	Qualitative/[No Design] (3)
4.	Qualitative/Phenomenology (3)
5.	Qualitative/Grounded theory (1)
6.	Qualitative/Case study (2)
7.	Case study [Only design, method not specified] (1)
8.	Quantitative/Relational survey (1)
9.	Quantitative/Descriptive survey model (1)
10.	Relational survey [Only design, method not specified] (7)
11.	Survey model [Only design, method not specified] (4)
12.	General survey model [Only design, method not specified] (2)
13.	Descriptive survey model [Only design, method not specified] (1)
14.	Descriptive statistics model [Only design, method not specified] (1)
15.	Mixed experimental design [Only design, method not specified] (1)
16.	Quasi-experimental design [Only design, method not specified] (1)
17.	Mixed method / Nested design (1)
18.	Mixed method / Explanatory sequential design (2)
19.	Activity and Rubric development (1)

3.2.Findings on the Methods and Designs of the Studies in YÖKTEZ Master's Documents

As shown in Table 8, it was observed that quantitative methods were predominantly used as the research method in master's theses. Following quantitative methods, mixed methods were preferred most frequently, while qualitative methods were used the least. In one of the analyzed documents, the research method was stated as mixed methods. In the quantitative part of this research, the designs used were described as descriptive analysis method, survey model, relational survey model, and comparative method. In the qualitative part of the study, however, one of the data collection techniques (semi-structured interview technique) was stated as the design used in qualitative methods without specifying which design will be used.

Table 8. *Codes regarding the methods and designs of the studies in the MA documents scanned in YÖKTEZ*

No	Codes
1.	Qualitative / Phenomenology (2)
2.	Qualitative / Nested multiple case design (1)
3.	Qualitative / Holistic multiple case design (1)
4.	Qualitative / Embedded design (1)
5.	Qualitative / Action research (1)
6.	Quantitative / Relational survey model (12)
7.	Quantitative / Descriptive survey model (3)
8.	Quantitative / Descriptive statistical model (1)
9.	Quantitative / General survey model (1)
10.	Quantitative / Cross-sectional survey model (1)
11.	Quantitative / Quasi-experimental design (1)
12.	Survey model [Design only, Method not specified] (2)
13.	Descriptive research method / Survey model [Similar to Design and Method] (1)
14.	Relational survey model [Design only, Method not specified] (5)
15.	Mixed / Explanatory sequential design (3)
16.	Mixed / Exploratory sequential design (3)
17.	Mixed / Explanatory mixed method (1))
18.	Mixed / Convergent parallel design (1)
19.	Mixed / Embedded design (1)
20.	Mixed / [No design specified] (2)
21.	No method (1)

In another document, after stating the method of the study as mixed methods, no information is provided regarding the quantitative stage, and the "Semi-structured interview technique" is stated as used in the qualitative method without specifying the qualitative design used. Furthermore, in mixed methods research, similar research designs are expressed in two different ways, as explanatory sequential design or exploratory sequential design. Additionally, in another document, there is no method section; the study proceeds directly to the findings after the theoretical framework section. It is understood from this document that the data were analyzed using document analysis method.

3.3.Findings on the Methods and Designs of the Studies in YÖKTEZ Doctoral Documents

The doctoral dissertations included in our study on critical thinking were analyzed within the theme of "Methods and Designs of Studies." The analysis revealed a higher preference for mixed methods in doctoral dissertations. In a study where a true experimental design was utilized, it was indicated that in addition to the research, interviews were conducted with teachers using a semi-structured form. Although qualitative methods were also employed in this study, the design was not specified; instead, the data collection technique was listed as the method (Table 9).

Table 9. *Codes related to the themes of methods and designs of the studies in Ph.D. documents scanned in YÖKTEZ.*

No	Codes
1.	Qualitative / Holistic multiple case design (2)
2.	Single case study (1)
3.	Quantitative / General survey model (1)
4.	Quantitative / Relational survey model (1)
5.	True experimental design (1)
6.	Mixed / Design-based research (1)
7.	Mixed / Nested design (3)
8.	Mixed / Sequential mixed method (1)
9.	Mixed / Triangulation model (1)
10.	Mixed / Parallel mixed design (1)

4.Theme 4: Results and Recommendations

While the first three themes of our study were comprehensively analyzed, the fourth theme, "Results and Recommendations of the Studies," was selectively analyzed to highlight the importance of critical thinking for teachers and school administrators. Only certain aspects of the results and recommendations were examined with a selective perspective.

4.1.Findings on the Results and Recommendations of the Studies in ULAKBİM Documents

In this theme, particularly aspects concerning teachers' and school administrators' "critical thinking situations," "use of critical thinking skills in educational/administrative activities," "the necessity of critical thinking in education/administration," "what teachers should do regarding critical thinking in their lessons," and "provision of critical thinking training for teachers and school administrators" were selectively analyzed. Moreover, due to the striking findings, direct quotations obtained from the results and recommendations sections of the documents were emphasized in this theme. Table 10 presents the codes obtained. (CT: Critical Thinking).

As shown in Table 10, there was a positive significant relationship between critical thinking and teacher professional ethics, crisis management attitude, reading habits, autonomy behaviors, program literacy, and organizational commitment. It can be said that the majority of teachers lack critical thinking skills or the use of critical thinking skills in educational practices.

Table 10. *Sub-themes and codes related to the results and recommendations theme in the documents scanned in ULAKBİM*

No	Sub-Theme	Codes	
1.	Positive and meaningful Relationship (CT and other variables)	Teacher	Autonomy behaviors
2.		Teacher	Program literacy
3.		Teacher	Reading habits
4.		Teacher and administrator	Organizational health
5.		Teacher and administrator	Organizational commitment
6.		Teacher and administrator	Professional, ethical principles
7.		(According to administrators)	Academic success

8.		(According to administrators)	Crisis management
9.	The Disposition of Teachers and School Administrators Regarding CT	Teacher	Asking rote-based questions
10.		Teacher *(Religion)*	Asking questions at the conceptual level
11.		Teacher	Difficulty in imparting CT skills
12.		Teacher	Impact of teacher's CT on students
13.		Teacher*)*	Low level of inclination towards CT
14.		Teacher *(Primary School)*	Weak awareness of CT
15.		Teacher	Need for CT education
16.		Teacher	Recognition of the importance of CT
17.		Teacher	CT skills at a certain level
18.		Teacher	High perception of CT education
19.		Teacher *(Science)*	Importance given to CT education
20.		Teacher *(Mathematics)*	High inclination towards metacognition
21.		*(Administrator)*	Necessity and indispensability of CT
22.		*(Administrator)*	Self-criticism regarding CT
23.	The acquisition of CT Skills	CT forming the foundation of higher-level skills	
24.		Longitudinal study of CT skills	
25.		Designing activities for CT instruction	
26.		Multidisciplinary approach to CT development	
27.		Importance of graduate education for CT	

It was also understood that school administrators value critical thinking. Below are excerpts from the articles supporting the codes reached in the "Results and Recommendations" theme:

> *"The critical thinking skills of teachers are crucial at the primary education level, yet it is a significant shortcoming that teachers at this level do not adequately demonstrate behaviors that support critical thinking in the classroom."*
>
> *"Teachers did not provide any explanations regarding assumptions, contexts, applications, and consequences related to the components of critical thinking."*
>
> *"A positive significant relationship was found between the general critical thinking attitudes of preschool teachers and general professional,*

ethical principles, as well as professional, ethical principles towards colleagues, students, and parents."

"The majority of teachers show deficiencies in using methods and techniques other than question-answer related to critical thinking education."

"Observations indicate that teachers fail to display indicators of critical thinking in the classroom context."

"In conclusion, it is evident that primary school teachers require training in dimensions, such as 'open-mindedness,' 'asking high-level questions,' 'questioning the accuracy- reliability of information,' and 'seeking evidence' to support critical thinking."

"According to the research, classroom teachers who read books every day are more analytical thinkers, open-minded, and curious compared to those who never read books."

"A person (Teacher) with a high level of cognitive maturity (one of the dimensions of critical thinking) is aware of their biases and tendencies in the decision-making process."

"There is a positive relationship between the critical thinking skills of secondary school teachers and organizational health."

"School administrators unanimously agree that critical thinking is essential for both individual and institutional development and for managing institutions effectively with sound decisions."

"Educational administrators who are aware that critical thinking is one of the keys to high school health should be trained and employed."

Upon examining the findings obtained from the results and recommendations sections of the documents, it can be said that they support the established codes and that critical thinking is an important factor for students, teachers, and school administrators.

4.2.Findings on the Conclusions and Recommendations of the Studies in YÖKTEZ Master's Documents

Within the framework of the theme "conclusions and recommendations of the studies," analyzed in the master's theses, once again, the situations of teachers and school administrators regarding "critical thinking," "their ability to use critical thinking skills in educational/teaching/management activities," "the necessity of being able to think critically for education/teaching/

management," and "the provision of critical thinking training for teachers and school administrators" have been focused on. Additionally, data regarding dimensions/components of critical thinking, such as using objective evidence, employing creative techniques, open-mindedness, and metacognitive skills were considered. The codes reached as a result of the analysis are presented in Table 11.

Table 11. *Sub-themes and codes related to the theme of conclusions and recommendations in the MA Documents scanned in YÖKTEZ*

No	Sub-Theme	Codes	
1.	Positive and meaningful Relationship (CT and other variables)	Media Literacy	
2.		Conducting eTwinning Projects	
3.		Leadership Skills	
4.	The Disposition of Teachers and School Administrators Regarding CT	*(Low-Administrator)*	Level of Open-mindedness
5.		*(Low-Administrator)*	Confidence in One's Own Thinking Process
6.		*(Low-Administrator)*	Being Open to Contrary Ideas
7.		*(Low-Administrator)*	Using Objective Evidence
8.		*(Low-Administrator)*	Making Decisions Based on Scientific Evidence
9.		*(According to administrators)*	Awareness of the Necessity of CT
10.		*(According to administrators)*	Valuing Metacognition
11.		(*Low-English)*	Innovative Practices
12.		*(Low- Teacher)*	Knowledge of CT Concepts
13.		*(Low- Teacher)*	Disposition Towards CT
14.		*(High-Preschool)*	Degree of Valuing CT
15.	The Importance of CT in Education	CT Guiding Self-Discovery	
16.		Insufficiency of CT in In-Service Trainings	

The analysis of the master's theses included in our study resulted in the codes shown in Table 11. When examining the generated codes, it was observed that critical thinking skills among teachers are generally weak. However, there were also data to the contrary. It is evident that school administrators associate critical thinking with leadership skills. Supporting quotations and findings obtained from the generated codes are presented below:

"When teachers with both education and science faculty backgrounds were evaluated together, it was concluded that they were inadequate in questioning skills, confidence in their own reasoning process, using objective evidence in the face of contrary situations, and in achieving the correct results through planned and programmed work."

"It has been determined that teachers with a tendency for critical thinking also have high levels of individual innovativeness."

"As the programming self-efficacy level of teachers increases, it has been concluded that the tendency for critical thinking also increases."

"Teachers with high self-consciousness have significantly higher levels of critical thinking in dimensions, such as reasoning, evidence searching, truth seeking, open- mindedness, and systematicity."

"It can be said that the 21st century has increased the importance of knowledge while accelerating change. It is necessary to have teachers who can meet these needs and follow the change. Therefore, preschool teachers should have critical thinking skills."

"There is a need for a guidebook to guide teachers in developing critical thinking skills, as a result of the interviews conducted with teachers."

"It has been found that receiving in-service training on critical thinking significantly increases the tendency for critical thinking among middle school mathematics teachers."

"The lack of quality in-service training on critical thinking leads to teachers' reluctance to participate in in-service training."

"It is necessary for teachers to receive training on how to develop their thinking skills as individuals and how to improve their students' thinking skills as teachers. These trainings can be provided at undergraduate and graduate levels as well as through in- service training programs."

"Some school administrators do not exhibit creative behaviors because they perceive ordinary environmental arrangements or school cleanliness as creativity."

"It has been found that some school administrators have a weak critical perspective due to their unscientific approach to questioning knowledge and its source."

"Some school administrators have a limited critical perspective because they do not welcome differences positively and unconditionally accept them."

"There is limited research on critical thinking skills of school administrators."

"In addition to conceptual/theoretical knowledge about critical thinking, school administrators need to receive training to enhance their critical thinking skills."

"Researchers can contribute to the dissemination of projects and training programs aimed at increasing 21st-century leadership skills and critical thinking skills among school administrators."

Through a selective perspective, the analysis conducted has led to the quotations provided above, reaching the sub-objective of our research. The findings emphasize the importance of critical thinking in our education system and its extent of inclusion.

4.3.Findings on the Conclusions and Recommendations of the Studies in YÖKTEZ Doctoral Documents

The documents included in our research from the doctoral dissertations on critical thinking scanned in YÖKTEZ Doctoral Documents have been analyzed within the framework of the theme "Results and Recommendations of the Studies." In this context, the focus has been on the "critical thinking status" of teachers and school administrators, their ability to use critical thinking skills in educational/administrative activities, the necessity of critical thinking in education, and the provision of critical thinking training for teachers and school administrators. Thus, the sub-objective of our research has been aimed to be achieved. The codes obtained from the analysis are shown in Table 12.

Table 12. *Sub-themes and codes related to the theme of conclusions and recommendations in the Ph.D. Documents scanned in YÖKTEZ*

No	Sub-Theme	Codes
1.	Positive and meaningful Relationship (CT and other variables)	Learning/teaching skills
2.		Learning behaviors
3.		Active learning methods
4.		Contemporary educational theories
5.		Socratic Inquiry Technique
6.		Skill in preparing purposeful questions
7.		Time management
8.		Multidisciplinary perspective
9.		Democratic classroom environment

10.	The Disposition of Teachers and School Administrators Regarding CT	Narrow view of CT
11.		Focusing on specific aspects of CT
12.		Inability to define critical thinkers
13.		Lack of Socratic method education
14.	The Importance of CT in Education	Incorporating CT instruction into the MoNE curriculum
15.		The importance of CT in professional development programs

Upon analyzing the results and recommendations sections of the doctoral dissertations, it is observed that, due to the participant group involved in the study, critical thinking is mainly discussed from the perspective of teachers. Additionally, attention is drawn to the effectiveness of critical thinking skills in educational methods and practices. The quotes obtained to support the generated codes are as follows:

> *"The majority of the participating teachers have a superficial focus on certain points regarding their critical thinking attitudes..."*
>
> *"Most teachers were unable to select tools and resources that could contribute to critical*
>
> *thinking education in their lessons..."*
>
> *"Positive, statistically significant relationships were found between the educational beliefs of primary and middle school teachers and their tendencies toward critical thinking and its sub-dimensions, such as progressivism, existentialism, and reconstructivism..."*
>
> *"Negative, statistically significant relationships were observed between the educational beliefs of primary and middle school teachers and their tendencies toward critical thinking and its sub-dimensions, such as essentialism (respect for institution and authority)..."*
>
> *"Following the training, teachers showed the greatest conceptual development in the 'Socratic Inquiry Technique,' which was considered to be practical and applicable by many participants..."*
>
> *"In topics such as 'reflecting on their own thinking processes,' teachers engaged in a*
>
> *self-inquiry process..."*
>
> *"Various theoretical and applied training activities such as reading articles, discussions, argumentation-based activities, and preparing*

questions suitable for various cognitive levels and critical thinking skills within the scope of the professional development program on CT contributed to teachers' pedagogies..."

"Although there was no significant difference between experimental and control group teachers before receiving critical thinking education, significant results in favor of the experimental group teachers were obtained after the training..."

"All teachers expressed that critical thinking can be developed."

"Creating products, systems, or education aimed at spreading critical thinking throughout life will both guide society's development and make a valuable contribution to the literature through scientific studies and projects."

From the quotes above, it can be inferred that critical thinking is positively associated with contemporary educational philosophies and encourages individuals to question themselves and their teaching practices. It is also evident that receiving critical thinking education contributes to personal development and improvement in educational methods. Furthermore, it is emphasized that critical thinking education should be supported by scientific research and projects.

Conclusion and Discussion

This study sought to reveal the paradigms, participant groups, methods/designs, results, and recommendations of critical thinking studies conducted with teachers and school administrators between 2018 and 2023, as well as to identify the importance of critical thinking for our education system and stakeholders, along with the need for critical thinking. This section includes results and discussion sections for each theme selected as the unit of analysis.

This section was designed by the researchers with a hermeneutic perspective. In the hermeneutic approach, data are interpreted sensitively to culture and context. In qualitative research, when participants are real individuals, it is possible to look beyond what appears to be, delve more profound, and create truth together with the participants (Patton, 2018). Considering that there were no real individuals as participants and documents were used as units of analysis, it is important to note that there was no direct response to the research questions; instead, the researchers had to find the desired answer themselves. Therefore, the researcher adopted a hermeneutic perspective aimed at uncovering what is truly important within the documents while staying within the framework of the research purpose. Moreover, the results were not merely summarized

by comparing them with existing literature (Yıldırım & Şimşek, 2018). With the belief that the researcher should be involved in the text, understand it, and question it from the hermeneutic perspective (Patton, 2018), the conclusion and discussion section were structured.

1.Results and Discussion on Research Paradigms of the Studies

Paradigm, in its nature, is significant for exploring assumptions about truth and reality and providing a philosophy or framework on how these will be investigated (Göksoy, 2019). The research paradigm clearly indicates the way of researching the subject, bringing clarity to the study and enhancing the quality of methods and analyses. Additionally, it is important for researchers to understand how their beliefs, assumptions, and biases can influence the research process (Ulz, 2023). The significance of choosing a paradigm for research lies in its foundational role in the methodology of the study. The paradigm is important as it clearly delineates how knowledge is understood, investigated, and motivated (Abbadia, 2022). Thus, the reader can better understand the researcher's perspective and its impact on the study results. Applying the chosen research paradigm effectively offers a clear path for the researcher and the reader to examine the topic of interest.

In this regard, it is believed that it is essential for research to have a paradigm, and the philosophy or approach adopted in the research should be clearly stated without leaving it to the reader's intuition. Among the documents included in the study, research paradigm, approach, or philosophy was mentioned in 13% of them. The approach adopted was mentioned in 3% of the articles scanned in ULAKBİM, 15% of the master's theses scanned in YÖKTEZ, and 30% of the doctoral dissertations. These approaches include "Quantitative paradigm, mixed quantitative and qualitative paradigm, exploratory qualitative research, hermeneutic (interpretive) paradigm, and social constructivism." Considering the importance of having a research paradigm and emphasizing it, it was found that the paradigm issue was not adequately considered in 86% of the examined documents. Moreover, there was no finding about the researcher's role in most of the documents examined. One of the main reasons for this situation is the lack of sufficient knowledge about paradigms and how to structure a study according to a paradigm. Philosophical concepts in educational research paradigms can be confusing and problematic for researchers (Kivunja & Kuyini, 2017; Orabah, 2021). However, simple recipes cannot be followed in planning and conducting research in education; it is a complex, reflective, and iterative process (Cohen, Manion & Morrison, 2018). It is believed that

considering the paradigm issue is necessary to enhance educational research (Pivovarova, Powers & Fischman, 2020).

2.Results and Discussion on Participant Groups of the Studies

When determining the theme of participant groups in the studies, individuals included in the research are referred to as "participants." In studies where the sample group is mentioned, they are also considered participants. Determining participants is one of the fundamental stages in research. Participants can be selected based on the qualities and criteria determined according to the purpose of the study.

In 91% of the documents included in the study, teachers were identified as the participant group. In 3% of them, teachers and school administrators were included, while only school administrators were selected as participants in 6% of the studies. It can be observed that the participating teachers come from various different branches (*see Table 4, Table 5, and Table 6*), demonstrating the relationship between critical thinking and different disciplines. It was concluded that teachers were selected as participants in most of the documents examined. The intensive collaboration with teachers in different branches and fields regarding critical thinking underscores the importance of the subject for our education system. However, it is not solely meaningful whether there is more collaboration with teachers or less with school administrators, as the purpose or problem of the study is crucial. Nevertheless, it is believed that it has been largely demonstrated that critical thinking is important for teachers in education. There is a need for further research on school administrators, who play a key role in creating an educational environment based on critical thinking and whose ability to think critically is also crucial (Blodgett, 2001; Cankaya, 2018; Henriksen & Aas, 2021; Özgenel, 2018; Polka, 2022; Öz & Balyer, 2018; Sudana & Apriyani, 2018).

3.Results and Discussion on the Methods and Designs of the Studies

Research methods refer to the behaviors and tools used in selecting and structuring the research technique (Kothari, 2004, p. 7). The research method is a way for the researcher to explain how they plan to conduct their study. It is a logical, systematic plan to solve a research problem. A research methodology legitimizes the research and enables the acquisition of scientifically sound findings. Additionally, it facilitates the process by providing researchers with a detailed plan to keep them on the right track, making the process smooth,

effective, and manageable (Indeed, 2023). Consequently, the reader can understand the approach and methods used to reach the results.

Within the framework of the theme of methods and designs of the studies, it was found that quantitative research methods were used in 54% of the analyzed documents, qualitative research methods in 23%, and mixed research methods in 23%. In some studies (primarily those conducted with quantitative methods), only the design was indicated without explaining the name of the method and why it was chosen. In studies conducted with qualitative methods, information about the method and design was generally provided, and how the design was structured was explained. It was concluded that most of the studies were conducted with quantitative methods; furthermore, a significant portion of quantitative research was conducted using survey models. Survey-type designs have many conveniences and benefits in several aspects. However, in such studies, interventions are generally not made. Especially in studies related to critical thinking, it is now thought that a next step should be taken, and an intervention should be made. It is believed that using survey models as the first step for research, such as action research or experimental design would be more beneficial. Similar designs were used in mixed-method research, with different names referring to the same design, such as sequential mixed design, explanatory sequential design, explanatory sequential design, and explanatory mixed method. In one mixed-method, the name of the design was not specified. In some mixed-method research, only information about the data collection technique was provided without specifying the design of the qualitative phase. Similarly, in some qualitative research studies, the data collection technique was reflected as the method of the study without explaining which design was used. In addition to these results, it was found that in some of the examined documents, the selected method was not explained, the definition of the design was not made, and the importance of working with the relevant method and design on the research topic was not indicated (Appendices 1 and 2). A solid choice and justification of methodology are crucial for educational research (Cai et al., 2019; Opoku, Ahmed & Akotia, 2016). It is necessary for our research to accurately express what our methodological selection is, to be familiar with the methodological literature in the environment (other methods), and to explain the methodology that is suitable for the research question well (Mutch, 2013).

4.Results and Recommendations on the Results and Discussion of the Studies

In qualitative research, the context guides the purpose and analysis. Distinguishing necessary information from unnecessary, identifying significant

patterns, conveying the essence of the data, and establishing a framework are required for interpreting the data in line with the purpose (Patton, 2018). Therefore, the results and recommendations sections, which constitute a voluminous dataset of all documents included in the research, have been framed in accordance with the purpose of the study. Hence, results related to demographic variables, textbook content , or curriculum-related matters have been excluded from the framework. The analysis within this theme has been conducted due to the reasons that the results sections of the studies should leave a lasting impression, frame or contextualize the research problem based on the study's findings, and provide detailed information about the impact and significance of the findings (Bunton, 2005). The documents included in this research, within the scope of the results and recommendations theme, were analyzed from a selective perspective to highlight the importance of critical thinking for teachers and school administrators. The key findings reached are as follows:

Critical thinking is associated with higher-order thinking skills such as metacognitive thinking. Supporting research studies regarding this conclusion exist in the literature. The relationship between higher-order thinking skills, referred to as Higher Order Thinking Skills (HOTS) in the literature, and critical thinking has been established (Mishra & Kotecha, 2015; Sagala & Adriani, 2019; Seman, Yusoff & Embong, 2017; Singh & Marappan, 2020; Tanujaya, Mumu & Margono, 2017; Virranmäki, Valta- Hulkkonen & Pellikka, 2021; Yuliati & Lestari, 2018).

Teachers struggle to impart critical thinking skills. Similar studies reaching similar conclusions can be found in the literature. Teachers may struggle to teach or impart critical thinking skills to students for various reasons (Alazzi, 2008; Alazzi & Bataineh, 2009; Baildon & Sim, 2009; Kowalczyk, Hackworth & Case-Smith, 2012; Choy & Cheah, 2009; Evangelisto, 2023).

The methods used by teachers in classes (e.g., assessment) generally do notfoster critical thinking. It can be observed that teachers do not use methods/ techniques that develop critical thinking when conveying subjects to students or evaluating students for feedback on subjects (Essalih, Ourahay & Khazami, 2022; Kasap et al., 2022; Larsson, 2019; Lombardi et al., 2021; Suratmi & Sopandi, 2022).

Teachers need training in critical thinking. Many studies supporting this conclusion suggest that teachers need training based on critical thinking and critical thinking skills (Fandiño Parra et al., 2021; Gül et al., 2014; Harris & Bruin, 2017; Lorencová et al., 2019; Nobre, 2019).

Critical thinking is positively correlated with academic achievement (Ghazivakili et al., 2014; Fong et al., 2017; Kleemola, Hyytinen & Toom, 2022; Ma, Zhang & Luo, 2021; Raugh et al., 2022), active learning methods (Oros, 2007; Espey, 2017; Hajhosseini et al., 2016), Socratic questioning technique (Katsara & De Witte, 2018; Lee, Kim & Kim, 2014; Yang, Newby & Bill, 2005), ability to prepare purposeful questions, program literacy, multidisciplinary perspective (Aarnikoivu et al., 2020; King et al., 2019), project making/ management skills (Krahn & Hartment, 2006; Martins, 2023), autonomy behaviors (Greenbank & Penketh, 2009; Raya, 2009), reading habits (Hasanah, 2022; Parikh, 2021; Yanti, 2018), organizational health (Bloom, 2010; Marks, 2023), organizational commitment (Sadoughi & Ebrahimi, 2014; Novikov, 2016), professional ethics principles (Maruyama & Ueno, 2010; Yiu, 2008), contemporary educational theories (Shi & Blau, 2020; Zuniga, 2014), crisis management (Leigh, 2016; Tripathy, 2021; Van de Ven & Neef, 2006), time management (Gustin, 2001; Santoso et al., 2021), and leadership skills (Safi & Burrel, 2007; Shang & Yu, 2013).

It has been concluded that school administrators sometimes engage in self-criticism regarding critical thinking, are sometimes not confident in their own thinking processes, are not open to opposing ideas, and do not use objective evidence-based data in decision-making. However, it has also been deducted that leadership skills through critical thinking can be developed (Barile, 2003; Jenkins, 2012; Polka, 2022).

In-service training programs related to critical thinking should be developed and disseminated to train educators (Afanasjeva et al., 2020; Ellerton, 2015; Hager & Kaye, 1992; Janssen et al., 2019; Khodabakhshzadeh & Ghaemi, 2011; Lithoxoidou & Georgiadou, 2023; Lombardi et al., 2022; Pasquinelli et al., 2020; Williams, 2005).

Limitations

In the document analysis method, it is necessary to outline a framework for the study. Therefore, our study has been limited in terms of time, document type, and database. Exclusion criteria include research conducted on critical thinking at other times, studies involving individuals in teacher education, news articles, national reports, publications from other databases, non-electronic publications, and books. This exclusion of documents outside the scope of the study constitutes a limitation of this research.

Findings related to demographic variables, such as age, gender, seniority, marital status, employment status, school type, settlement unit, and educational level, as well as findings related to curriculum and textbook content, in the

results and recommendations sections of the documents included in the study, were not analyzed due to the belief that they are not relevant to the purpose of our study. However, it is challenging to be sure that the excluded sections would not be useful for this study, which also constitutes another limitation.

Report

The reporting stage is crucial for others to understand what and how you have learned. The final report should address each fundamental evaluation question (each theme) without including all the collected data (Patton, 2018). In this framework, the final report of our study was prepared.

This study aims to reveal the paradigms, participant groups, methods/designs, results, and recommendations of critical thinking studies conducted with teachers and school administrators between 2018 and 2023, along with emphasizing the importance of critical thinking for our education system and stakeholders, and the need for critical thinking. Documents were selected based on criteria determined according to the purpose of the research. Therefore, only studies on critical thinking involving teachers and school administrators were included as data sources. In this study, 35 articles scanned in ULAKBİM, 45 master's theses scanned in YÖKTEZ, and 13 doctoral dissertations published between 2018 and 2023 were analyzed using the document analysis method. The research was conducted with an interpretive approach, adhering to the research design specified in the methods section and following Fitzgerald's (2012) stages of document analysis.

The documents were examined within the framework of the themes "Paradigms of Studies, ""Participant Groups of Studies," "Methods and Designs of Studies," and "Results and Recommendations of Studies. "The theme of paradigms of studies delineates the expression of a paradigm, philosophy, or adopted approach in research, forming the scientific framework of the study, conveying the meaning attributed to the research, demonstrating the value attributed to it, and guiding the reader, as believed. The theme of participant groups of studies was determined by the idea that the groups applied for obtaining data in studies are important and the curiosity about the rates of participation of teachers and school administrators in the research. The theme of methods and designs of studies was created due to the importance of this step in designing studies, the belief that it is a critical step in reaching the outcome, and the curiosity about the ratio of quantitative, qualitative, or mixed methods selected in the studies. The theme of results and recommendations of studies was determined by the belief that the results and recommendations section in the research leaves a lasting impression on the reader, provides detailed

information about the impact and importance of the findings, and constitutes a section where the importance of critical thinking for our education system and stakeholders and the need for critical thinking are emphasized.

The documents included in the research were first analyzed within the framework of the theme of paradigms of studies. In 12 of the 93 studies examined, a paradigm, philosophy, or approach was mentioned and associated with the relevant study. It is considered that this rate is relatively low, especially for studies focusing on a topic based on the critical theory, such as critical thinking. It can be argued that it is crucial for researchers at the beginning of the planning and implementation process of educational research to determine how they will start with a paradigm, draw a scientific framework with what kind of philosophy, how they will base their studies on the adopted approach, and determine the meaning and value they will attach to their studies.

The documents were secondly analyzed within the framework of the theme of participant groups of studies. It was observed that teachers were predominantly studied in a significant portion of the research. Selecting the participant group according to the aim of the research is quite natural. Therefore, primarily, teachers participated in the studies. In this sense, it is believed that emphasizing the importance of critical thinking for teachers is significant. It is also believed that school administrators, important stakeholders in our education system, should be able to think critically. In this context, it is considered that more studies on critical thinking with school administrators are needed.

The documents included in our research were thirdly analyzed within the framework of the theme of methods and designs of studies. As a result of the analysis, it was found that 50 studies were conducted with quantitative methods, 21 studies used qualitative methods, and another 21 studies employed mixed methods. One study did not have a separate methods section. As seen in Tables 7, 8, and 9, predominantly survey designs were used in quantitative studies. It can be stated that in some studies, terms, such as model/design, were used interchangeably, sufficient information about the selected method/design was not provided, or the relationship between the purpose of the study and the method/design was not explained. In studies conducted with qualitative methods, it was observed that generally, an explanation about the nature of qualitative research and what it is was provided, the selected design was defined, and information about how the study was designed was given. In some studies employing mixed methods, it can be said that different names referring to the same design were used, and the information about the qualitative phase was weak. However, it was observed that the method section was detailed in many

studies, the relationship between the purpose of the study and the method was explained, and information about how the study was designed was provided.

Finally, the documents were analyzed within the framework of the theme of results and recommendations of studies. In line with the aim of this research, results and recommendations concerning demographic variables unrelated to our study, such as the textbook content or curriculum, were not included in the analysis. Instead, results and recommendations emphasizing the significance of critical thinking for our education system and stakeholders and the need for critical thinking were considered. However, no criterion, such as the repetition of a finding in other documents, was established, and according to the paradigm we adopted in the research, it was sufficient for a finding to be unique and important for it to be evaluated as a finding for this theme. In this sense, the following main results have been reached:

- Critical thinking is associated with higher-order thinking skills. Teachers face significant challenges in imparting critical thinking skills.
- The methods teachers use in their lessons generally do not foster critical thinking. Teachers are in need of training in critical thinking.
- Critical thinking is in a meaningful positive relationship with;
    - ◊ Academic achievement
    - ◊ Program literacy
    - ◊ Organizational health
    - ◊ Active learning methods
    - ◊ Multidisciplinary perspective
    - ◊ Professional, ethical principles Socratic questioning technique
    - ◊ Project development/management skills
    - ◊ Crisis management
    - ◊ Skill in preparing purposeful questions
    - ◊ Reading habits
    - ◊ Time management
    - ◊ Contemporary educational theories
    - ◊ Leadership skills

Based on their own statements, school administrators engage in self-criticism, sometimes lacking confidence in their own thought processes, not relying on

objective evidence in decision-making, and being closed to opposing views. It is believed that through critical thinking, school administrators' leadership skills can be enhanced. In- service training programs related to critical thinking should be designed and widely implemented to educate educators.

Considering all these results, critical thinking is highly important for our education system, teachers, school administrators, and other stakeholders affected by the education process. Pre-service and in-service training programs should be provided to teachers and school administrators to promote critical thinking. A learning environment based on critical thinking, an essential 21st-century skill, can be established in classrooms and schools.

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CHAPTER 2

The Role of the Primary School Teacher in Helping Students Develop the Ability to Protect Their Rights

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ABSTRACT

Advocacy is defined as the actions individuals take to protect, promote, and uphold their rights. The ability of individuals to protect their rights and prevent violations is of significant importance to society as a whole. This study aims to determine the role of primary school teachers in helping students acquire the skills to protect their rights. It is based on the assumption that primary school teachers contribute to students' understanding of their individual rights and responsibilities.

This study is significant for assessing the extent to which primary school teachers address students' rights, teach them how to protect and assert these rights, and implement related practices. Furthermore, it highlights the role of primary school teachers in rights advocacy, thereby facilitating the development of instructional practices grounded in a rights-based approach.

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The study employs a qualitative research design, specifically a case study approach. Within the study, the convenience sampling method, a type of purposive sampling, was utilized. The study group consisted of 15 primary school teachers working in Eskişehir during the spring semester of the 2025–2026 academic year. Data were collected using a semi-structured questionnaire and analyzed through content analysis. Participants voluntarily took part in the study, and their individual perspectives were presented to ensure generalizability. To enhance the research's credibility, the data were reviewed by two experts, and the statements were categorized into themes. According to the findings, teachers consider the process of developing students' rights protection skills to be important.

According to the study's findings, teachers consider the process of developing students' rights protection skills to be important. They identify the primary reasons as the need to cultivate a sense of justice, adherence to moral values, and the development of empathetic thinking. In the classroom, students most frequently report violations related to equality and fairness, both during games and with s. Teachers tend to perceive and address these issues on a case-by-case basis. It was also observed that, due to the influence of family and culture, students often struggle to express their feelings, and teachers do not actively make efforts to teach rights protection skills. However, teachers believe that including such instruction in the curriculum would be a timely and appropriate measure.

Based on the study's findings, fostering students' rights protection skills in the classroom can contribute to children's rights education, support school-based practices that prevent rights violations, and help students become conscious, confident, and active individuals regarding their rights. It is recommended to provide pre-service and in-service training for teachers on children's rights and advocacy, create participatory classroom environments, and strengthen school-family collaboration

Keywords: Primary school teacher, rights protection skills, student

INTRODUCTION

Advocacy is defined as initiatives aimed at restructuring the environment to address disadvantages stemming from cultural factors such as an individual's disability status, gender, ethnic origin, race, social class, physical appearance, language, immigration status, and family characteristics (Ministry of National Education, General Directorate of Special Education and Guidance Services, 2018). Başçıllar (2021) notes that advocacy serves an important function in addressing societal challenges, enhancing individual and social capacity,

fostering environmental change, balancing power dynamics, and promoting collaboration.

Within the education system, teachers bear a significant responsibility for equipping students with advocacy skills. According to Ural (2020), the Transformative Intellectual Teacher fosters a more democratic educational environment and serves as a role model for students to develop the skills to stand up against inequalities and defend their rights. A teacher is not merely a person who transmits knowledge, but also a guide who safeguards students' rights, strengthens their sense of justice, and supports social equality. According to Karataş (2020), the teacher is a model who encourages students' personal development and plays a significant role in helping them adopt social norms. In both in-school and out-of-school learning environments, teachers assume vital roles in protecting and advancing students' rights.

Increased awareness of children's rights not only supports students' individual development but also fosters a more democratic school culture (Akyüz, 2012). Teachers' role as advocates contributes positively to students' understanding of justice and has a developmental impact on promoting equity in education (Lee, 2007; Ratts, DeKruyf & Chen-Hayes, 2007). Furthermore, teachers' advocacy skills enhance trust in school and classroom environments, thereby laying the groundwork for the institutionalization of participation and social justice (Holcomb-McCoy, 2007). Therefore, efforts to develop teachers' advocacy competencies can go beyond individual teacher competencies and simultaneously improve the overall quality of the education system.

A review of the literature reveals that studies addressing teachers' roles in helping students acquire and develop the ability to protect their rights—whether in the classroom, the school environment, or out-of-school learning settings—remain very limited. With the aim of contributing to the literature in this context and serving as a model for future research, this study will examine teachers' roles in fostering students' ability to protect their rights and seek answers to the following questions:

What is the level of teachers' knowledge regarding children's rights?

What is teachers' views on fostering students' ability to protect their rights?

What is teachers' initial interventions when students experience rights violations, and to what extent do these interventions occur?

What practices do teachers employ to help students develop the ability to protect their rights in both school and out-of-school learning environments?

METHOD

This study is a case study, one of the qualitative research designs. The convenience sampling method was used as the sampling technique. The study sample consists of 15 primary teachers working in the province of Eskişehir during the spring semester of the 2025–2026 academic year. Research data were collected using a semi-structured form and analyzed through content analysis. The study ensured transferability by including participants' voluntary, one-on-one interviews; to enhance the study's credibility, the data were evaluated by two researchers who are experts in the field, and the statements were categorized into themes.

FINDINGS

It is evident that the vast majority of teachers participating in the study are women (86.7%) and are in the early or middle stages of their careers. In terms of educational level, the fact that 33.3% of the group holds a master's degree indicates a profile with high academic awareness. However, the most striking demographic finding of the study is that 93.3% of the teachers (N=14) had not previously received any specialized training on "Advocacy." Only the teacher coded as T1 indicated having received training in this area. This data is of critical importance as it suggests that teachers' classroom practices rely more on personal experience, intuition, and general pedagogical knowledge rather than professional training.

The first of the emerging main themes is the importance of equipping students with advocacy skills and the rationale behind this. While teachers agree that fostering advocacy in students is a critical necessity, they offer different justifications for the reasons behind it.

Table 1: Teachers' Views on the Importance of Advocacy

Category	Sample Statements	Participants	f
Communication Skills	"Ability to express oneself," "Respect for others' rights," "Sense of justice," "Empathy"	T1, T6, T7, T8, T9, T13	6
Socialization and Civic Awareness	"Participation in social life," "Knowing one's rights as a citizen," "Constitutional rights"	T4, T5, T6, T14, T15	4
Moral and Holistic Development	"Moral development," "Being a defender of all truths," "The duty of being human"	T2, T3, T11	3

Communication Skills Category

This category is based on the premise that teachers emphasize the importance of equipping students with advocacy skills; specifically, enabling students to express themselves, respect the rights of others, develop a sense of justice, and build empathy. Teachers who support this view (T1, T6, T7, T8, T9, T13) have emphasized that advocacy is not merely an individual achievement but also a tool for establishing healthy communication. All teachers considered the development of advocacy skills to be important. However, they grounded their justifications for this importance on different foundations. Some teachers based their views on both categories (T6). Others simply stated that it was important without grounding it in a specific basis (T10, T12).

Socialization and Civic Awareness Category

This category encompasses teachers who grounded the importance of fostering advocacy skills in students on the foundations of participation in social life, constitutional rights, and civic consciousness. Teachers in this group (T4, T5, T6, T14, T15) viewed advocacy as part of an individual's adaptation to society and fulfillment of civic duties.

Moral and Holistic Development Category

This category represents the teachers' view that the importance of equipping students with advocacy skills is grounded in moral development, the defense of all truths, and the inherent necessity of being human. Teachers in this group (T2, T3, T11) approached advocacy not merely as a legal or communicative skill, but also within the context of an individual's character development and the integrity of education.

The second main theme was rights violations encountered in the school environment. These rights violations are grouped into four distinct categories: violations of the right to play, failure to adhere to the principle of equality, disregard for the right to communication and free speech, and incidents of physical and verbal violence.

Table 2: Most Commonly Encountered Rights Violations

Type of Violation	Observed Behaviors	Frequency (f)	Teachers Involved
Category of Play Rights Violation	Exclusion from play, controlling the game, refusing to share materials, exclusion	7	T1, T2, T6, T7, T8, T9, T15
Violation of the Principle of Equality	Discrimination, establishing a hierarchy, pressure from older children on younger ones	3	T2, T3, T14
Violation of Communication and Right to Speak	Interrupting, speaking without permission, not listening	4	T5, T9, T12, T13
Physical and Verbal Abuse	Peer bullying, pushing, violence	2	T9, T11

Violation of the Right to Play Category

This category represents the most common type of rights violation teachers encounter in the school environment and is based on the opinions of seven teachers (T1, T2, T6, T7, T8, T9, T15). This category includes behaviors such as students excluding peers from games, a single person controlling the game, failure to share game materials, and exclusion from play groups.

Violation of the Principle of Equality Category

This category covers situations where students exhibit attitudes contrary to the principle of equality, engage in discrimination, or attempt to establish a hierarchy among themselves in the school environment. Based on the views of three teachers (T2, T3, T14), under this heading, issues of equality in education and behaviors such as students asserting superiority over one another were evaluated as “pressure from older students on younger ones.”

Communication and Violation of the Right to Speak Category

This category covers situations in the school environment where students interrupt one another, speak without permission, fail to listen to one another, or are prevented from expressing their thoughts. Based on the views of four teachers (T5, T9, T12, T13), this section highlights violations of classroom communication rules and restrictions on freedom of expression.

Physical and Verbal Violence Category

This category covers situations where students use physical force against one another or make harmful verbal statements in the school environment. Under this heading, based on the views of two teachers (T9, T11) , peer bullying, pushing, and behaviors involving direct violence are included.

The third theme focuses on teachers' intervention methods regarding rights violations occurring at school while fostering students' advocacy skills. This category reflects an approach where, rather than resolving the issue solely within the classroom, teachers prefer to refer the matter to relevant units—such as the school counseling service (PDR), school administration, or the family—when faced with rights violations. In this category, which includes six teachers (T5, T9, T10, T11, T12, T13), the act of referral was evaluated both as a form of intervention and as a collaborative process.

Table 3: Forms of Intervention

Category	Sample Statements	Participants	f
Intervention Category	Immediate cessation of the violation, use of authority, concrete warning	T3, T5, T15	3
Resolving Category	Listening, fostering empathy, creating space for expression, sharing the appropriate attitude	T1, T2, T6, T7, T9	5
Referral Category	Referral to counseling services, administration, or family	T5, T9, T10, T11, T12, T13	6

Intervention Category

This category describes an approach in which the teacher immediately and directly intervenes in the process when a rights violation occurs, stops the violation, or uses their authority to bring the situation under control. Teachers in this category (T3, T5, T15) focus on immediately halting the violation and making it concretely noticeable.

Resolving Category

This category describes an approach where the teacher listens to the student in the face of a rights violation, attempts to understand their feelings, allows them to express themselves, and focuses on resolving the issue through empathy or mediation. In this approach, adopted by five teachers (T1, T2, T6, T7, T9),

the primary goal is not merely to stop the incident but to transform the process into a pedagogical gain by sharing what the appropriate attitude should be.

Guiding Category

This category refers to the approach where, in the face of rights violations, teachers prefer to refer the issue to relevant units—such as the school counseling service (PDR), school administration, or the family—rather than resolving it solely within the classroom. In this category, which includes six teachers (T5, T9, T10, T11, T12, T13), the act of referral was evaluated both as a form of intervention and as a collaborative process.

CONCLUSION AND DISCUSSION

In this study, the roles of primary teachers in the process of acquiring the ability to protect students' rights were examined in detail, and significant findings were obtained based on the perspectives of the participating teachers. The research results reveal how teachers define the concept of rights advocacy, the rights violations they encounter, how they intervene in such situations, and the challenges they face during the process.

An analysis of the demographic data revealed that the vast majority of teachers (93.3%) had not previously received any training in advocacy. This indicates that teachers' approaches in the classroom are based on personal experience and intuition rather than professional training. The finding highlighted by Dağlı (2022) in the literature—that the development of rights-based education and advocacy skills is neglected in teacher training programs—aligns with the findings of this study. In contrast to the ideal of the "Transformative Intellectual Teacher"—as defined by Ural (2020)—who democratizes the educational environment and serves as a role model for students in developing rights advocacy skills, it can be said that the participating teachers experienced difficulties and uncertainty in actively assuming this role due to their lack of training. However, as noted by Akyüz (2012) and Holcomb-McCoy (2007), teachers' engagement in advocacy efforts is not merely a matter of individual development but a fundamental element that democratizes school culture and institutionalizes social justice. According to the findings, teachers consider the process of developing their ability to protect students' rights to be important. They attribute the primary reason for this to the need to develop a sense of justice, adherence to moral values, and empathetic thinking. It is observed that teachers justify this importance across three distinct dimensions; these dimensions are "Communication Skills," which emphasizes that advocating for rights is also a means of establishing healthy communication; "Socialization

and Civic Awareness," which focuses on an individual's adaptation to social life and constitutional rights; and "Moral and Holistic Development," which views the issue as an inherent requirement of being human. In the classroom setting, students most frequently complained about violations of equality and justice in both games and lessons; teachers perceived and resolved these issues individually; and due to the influence of family and culture, students struggled to express their emotions; and while teachers are not currently making an effort to teach rights protection skills, they believe it would be a sound decision if such content were added to the curriculum. According to the findings**,** teachers encounter four main types of violations: violation of the right to play, violation of the principle of equality, violation of the right to communication/speech, and physical/verbal violence. In particular, the fact that violations of the right to play (exclusion from play, refusal to share materials, and ostracism) were the most frequently encountered type of violation (N=7) is noteworthy in the context of the developmental characteristics and social skills of primary

school-aged children. The findings reveal that teachers developed three distinct strategies in response to rights violations: "Interventional," "Resolution-Oriented," and "Guiding." While the authority-focused "Interventional" approach, aimed at immediately stopping the violation, may resolve the crisis moment, the "Problem-Solving" approach—which pedagogically creates a space for the student to express themselves through listening and empathy and fosters the correct attitude—can be considered the preferred approach. However, according to the findings of the study, one of the key findings is that the most frequently used method is the "Referral" strategy (N=6), which involves referring the issue to the counseling service, administration, or family. The fact that teachers frequently prefer referral rather than resolving issues directly within the classroom through pedagogical means may be a result of their lack of training in advocacy. This situation also indicates that teachers struggle to address rights violations on their own and require coordination with school administrations and counseling services. According to the findings, it has been determined that students struggle to express their emotions due to the influence of family and culture. It can be argued that authoritarian structures within the family or cultural norms hinder children from asserting their rights, which directly complicates the teacher's ability to teach advocacy within the classroom. Therefore, strengthening school-family collaboration is a critical necessity to help children overcome the repressive or timid attitudes they are exposed to at home.

In conclusion, while primary teachers view the development of students' ability to protect their rights as essential for justice and moral development,

it can be said that they struggle to play a fully effective role in this process due to a lack of training and family-related challenges.

RECOMMENDATIONS

Based on the research findings, primary teachers' efforts to help students develop the ability to protect their rights in their lessons could offer a unique contribution to the literature on children's rights education and advocacy, support preventive and empowering practices against school-based rights violations, and contribute to raising students as conscious, self-confident, and effective individuals regarding individual and social rights . To effectively address rights violations, a school climate that is both preventive and empowering must be created through coordination among school administrations, counseling services, and teachers. It is recommended that pre-service and in-service programs be organized to enhance primary teachers' knowledge and awareness regarding children's rights and advocacy; that participatory classroom environments be established; that methods for objecting to violations be taught; and that training be provided by field experts on how to strengthen school-family partnerships and create a supportive school climate.

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CHAPTER 3

The Effect of Teacher Professional Learning on Organizational Learning: The Mediating Role of Self-Efficacy

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Abstract

This study aims to examine the impact of teachers' professional learning on organizational learning and the mediating role of teachers' self-efficacy in this relationship. Conducted as a correlational survey, the study's population consisted of teachers working in Gaziantep province during the 2025–2026 academic year. Convenience sampling was used, and data were collected from 373 teachers. The Teacher Professional Learning Scale, the Teacher Self-Efficacy Scale, and the Organizational Learning Scale were employed for data collection. Data analysis was performed using SPSS and the PROCESS macro (Model 4) developed by Hayes. The relationships among variables were analyzed via correlation analysis, while predictive and mediating effects were explored through regression and bootstrap methods. Results indicated positive and significant correlations between teachers' levels of professional learning, self-efficacy, and organizational learning. Regression analysis showed that both professional learning and self-efficacy significantly predict organizational

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learning. Additionally, mediation analysis revealed that self-efficacy partially mediates the relationship between professional learning and organizational learning.

Keywords: professional learning; self-efficacy; organizational learning

Introduction

Today, educational institutions are in a continual process of renewal in order to adapt to evolving social and technological conditions. In this context, it is not sufficient for teachers to merely maintain their existing knowledge and skills; they are also expected to be adaptable, open to learning, and committed to ongoing professional development (Bayram, 2010). This highlights the importance of professional learning, which includes teachers' self-improvement and lifelong learning. An increase in teacher learning is a key factor in enhancing the quality of education in schools (Borko and Putnam, 1995; Desimone, 2009).

Teacher professional learning is a multidimensional concept that refers to teachers' ongoing efforts to acquire, develop, and expand their knowledge, pedagogical skills, and professional competence with the goal of enhancing their classroom practices (Kwakman, 2003; Opfer and Pedder, 2011). Liu et al. (2016) conceptualize professional learning as an integrated framework consisting of collaboration, reflection, experimentation, and engagement with knowledge resources. These dimensions show how teachers share experiences with colleagues, test teaching strategies, engage in self-evaluation, and seek feedback from students and outside sources. In this framework, effective professional learning happens through teachers' active involvement in continuous improvement within supportive school environments. Here, the school serves as a social learning space where teachers improve their teaching through interaction and collaboration with colleagues and by reflecting on their practices (Borko, 2004; Vescio, Ross, and Adams, 2008).

A review of the literature on professional learning shows that this concept relates to various organizational variables (Anderson and Oliver, 2022; Liu et al., 2016). One of these is organizational learning capacity. The literature establishes that professional learning communities directly enhance organizational capacity (Nural, 2023). Within this framework, organizational learning can be seen as one of the institutional-level expressions of professional learning.

Organizational learning is defined as the ability of organizations to generate, share, interpret, and turn knowledge into action. In educational institutions, organizational learning involves transforming teachers' individual learning

into a collective structure, creating a shared knowledge base, and applying this knowledge in the school's practices (Senge, 2014). According to Senge (2006), learning organizations are structures where individuals continuously develop their abilities to reach desired goals, value new perspectives, and learn to learn collectively.

For schools to become learning organizations, it largely depends on teachers' active participation in professional development and sharing these experiences within the organization. In this context, it is believed that there is a connection between teacher professional learning and organizational learning. However, the transforming of the benefits teachers gain from their professional growth into organizational knowledge occurs through teacher-specific individual traits. At the heart of this process are individuals' attitudes toward learning and their perceptions of competence (Güzen, 2020). One of the key factors in explaining the transfer of professional learning to organizational learning is teacher self-efficacy.

In accordance with Bandura's (1997) social cognitive theory, teacher self-efficacy as conceptualized by Tschannen-Moran and Woolfolk Hoy (2001) refers to teachers' belief in their ability to organize and carry out practices that support student learning. In other words, teacher self-efficacy is also understood as teachers' belief in their capacity to plan, organize, and execute the necessary activities to meet educational goals (Skaalvik ve Skaalvik, 2009).

This study investigates the relational dynamics within Social Cognitive Theory, as described by Pajares (2002). Social cognitive theory relies on the concept of reciprocal determinism, which posits that three elements—individual factors, environmental factors, and behavior—are interconnected. According to this theory, individuals' interpretations of the consequences of their behavior influence both their environment and personal factors. In this study, this model is grounded in teachers' perceptions.

Based on the conceptual framework outlined above, the existing literature remains limited in explaining how self-efficacy mediates the effect of teachers' professional learning on organizational learning. Building on this gap, this study aims to examine the impact of teachers' professional learning on organizational learning, based on teachers' perceptions, and to explore the mediating role of teachers' self-efficacy in this relationship.

In line with this objective, the research questions are as follows:

1. What are teachers' perceptions of professional learning, self-efficacy, and organizational learning?

2. Are there significant relationships between these variables?

3. Are teachers' levels of professional learning and self-efficacy significant predictors of organizational learning?

4. Does self-efficacy serve as a mediator in the effect of teachers' professional learning on organizational learning?

Method

Research Method

This study investigates the mediating role of self-efficacy in the relationship between teachers' professional learning and organizational learning. In the study, professional learning was considered the independent variable, organizational learning the dependent variable, and self-efficacy the mediating variable. To examine the direction and strength of the relationships between these variables, a correlational survey model was used within a quantitative research framework (Büyüköztürk, 2021).

Sample

The study sample consists of secondary school teachers working in the Şahinbey district of Gaziantep province during the 2025–2026 academic year. Due to time and accessibility constraints, a convenience sampling method was employed, resulting in a total of 373 teachers. Of these participants, 186 (49.9%) were female and 187 (50.1%) were male. The age distribution shows that 11.5% of participants (n=43) were aged 22–26, 24.1% (n=90) were aged 27–31, 24.4% (n=91) were aged 32–36, 18.0% (n=67) were aged 37–41, and 22.0% (n=82) were aged 42 and over. The majority of participants are in the 32–36 age group. In terms of educational background, 79.4% (n=296) of participants hold a bachelor's degree, and 20.6% (n=77) hold a postgraduate degree. Regarding professional seniority, 22.5% (n=84) have 1–5 years of experience, 26.5% (n=99) have 6–10 years, 17.7% (n=66) have 11–15 years, 19.6% (n=73) have 16–20 years, and 13.7% (n=51) have 21 or more years. The largest group is those with 6–10 years of experience. Concerning length of service at the school, 40.5% (n=151) have served 1–5 years, 34.0% (n=127) for 6–10 years, 19.6% (n=73) for 11–15 years, and 5.9% (n=22) for 16–20 years.

Data Collection Tools

Teacher Professional Learning Scale

The scale was developed by Liu, Hallinger, and Feng (2016) and adapted into Turkish by Gümüş, Apaydın, and Bellibaş (2018). It includes 27 items

and employs a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Reliability analysis indicated that the omega reliability coefficient was .92.

Teacher Self-Efficacy Scale

The scale was developed by Tschannen-Moran and Hoy (2001) and adapted into Turkish by Karaoğlu (2019). It consists of 12 items and uses a 9-point Likert scale (1 = not at all competent, 9 = very competent). The scale's overall Cronbach's alpha coefficient was calculated as .88.

Organizational Learning Scale

The scale was developed by Silins, Mulford, and Zarins (1999) and adapted into Turkish by Korkmaz (2006). It includes 26 items and uses a 5-point Likert scale (1 = I strongly disagree, 5 = I strongly agree). The Cronbach's alpha internal consistency coefficient for the scale ranges between .91 and .94, with a value of .96 for the entire scale.

Data Analysis

SPSS 27 was used for the descriptive and correlational analysis of the collected data. For the regression-based mediation analysis, the Process Macro in the SPSS add-in (Model 4) developed by Hayes was employed (Hayes, 2022). After cleaning and organizing the dataset, checks were performed for data entry errors and missing values. To evaluate the normality of the data, the mean, median, skewness, and kurtosis were examined, along with z-scores, histograms, and scatter plots.

Following the descriptive analysis, correlations were analyzed to determine if there were significant relationships between variables and, if so, the direction of these relationships. To assess the predictive power of the data and any mediating effects, analyses were conducted using the PROCESS Macro add-in developed by Hayes for SPSS, utilizing the bootstrap technique with 5000 resampling iterations (Hayes, 2022).

Validity and Reliability

The validity and reliability of the measurement instruments used in the study were evaluated based on both literature findings and the current dataset. Cronbach's alpha coefficients were calculated to assess the reliability of the scales. Skewness and kurtosis values were examined as part of normality testing. For the organizational learning scale, skewness was -.532 and kurtosis -.337; for the professional learning scale, skewness was .125 and kurtosis -.999; and for the self-efficacy scale, skewness was -.973 and kurtosis 1.220.Considering the

thresholds recommended by Kline (2011), these values are within an acceptable range. Furthermore, histogram and boxplot examinations indicate that the data exhibit an approximately normal distribution. These findings indicate that the data are suitable for parametric and mediation analyses.

Results

Descriptive Statistics and Correlation Analysis Results

Descriptive statistics and the relationships between variables concerning teachers' levels of professional learning, self-efficacy, and organizational learning are presented in Table 1.

Table 1. Descriptive Statistics and Correlation Results

Variable	*M*	*SD*	*1*	*2*	*3*
1. Professional Learning	3.18	*.50*	-		
2. Self-efficacy	*3.72*	*.66*	.233**	-	
3. Organizational Learning	*3.26*	*.80*	.506**	.419**	-

**p<.01

Table 1 presents the descriptive statistics and correlation analysis results for all variables. As shown in Table 1, the average scores and standard deviations for the teachers' scales are: the professional learning scale M = 3.18 (SD = 0.50), the self-efficacy scale M = 3.72 (SD = 0.66), and the organizational learning M = 3.26 (SD = 0.80).

The correlation analysis indicates that professional learning is moderately positively but weakly correlated with self-efficacy ($r = .233$, $p < .01$). A moderate positive relationship was found between professional learning and organizational learning ($r = .506$, $p < .01$). There is also a significant positive relationship between self-efficacy and organizational learning ($r = .419$, $p < .01$). Based on these results, it can be concluded that as teachers' levels of professional learning increase, their self-efficacy increases to a low-to-moderate degree, while their levels of organizational learning increase to a moderate degree. Additionally, it is observed that as teachers' self-efficacy levels rise, their levels of organizational learning also increase to a moderate degree. When all these findings are considered together, it can be concluded that there are positive, moderate relationships among the variables of professional learning, self-efficacy, and organizational learning.

Regression Analysis Results

A multiple linear regression analysis was conducted to determine whether professional learning and self-efficacy significantly predict organizational learning. The results of the regression analysis between these variables are presented in Table 2.

Table 2. Results of the Regression Analysis for the Variables

Variable	***B***	**SE B**	***β***	***t***	***p***
Constant	-0.343	0.257	—	-1.335	.183
Professional Learning	0.686	0.068	*.431*	10.017	< .001
Self-Efficacy	0.382	0.052	*.318*	7.396	< .001

Dependent variable: Organizational Learning. R = .593, R^2 = .352, Adjusted R^2 = .348, F(2, 370) = 100.28, p < .001. B = unstandardized coefficient; SE = standard error; β = standardized coefficient.

An shown in Table 2 reveals that the regression model is statistically significant: $F(2, 370) = 100.28$, $p < .001$. The findings indicate that this model explains 35.2% of the variance in organizational learning ($R^2 = .352$). Therefore, this finding indicates that as teachers' levels of professional learning and self-efficacy increase, their levels of organizational learning also increase.

Professional learning has a significant and positive effect on organizational learning ($B = 0.686$, $\beta = .431$, $t = 10.017$, $p < .001$). Additionally, self-efficacy significantly and positively impacts organizational learning ($B = 0.382$, $\beta = .318$, $t = 7.396$, $p < .001$). Overall, these results suggest that both professional learning and self-efficacy are positively and significantly related to organizational learning and serve as key predictors of it.

Results of the Mediation Analysis

The mediating role of self-efficacy in the relationship between professional learning and organizational learning was examined using Hayes' (2022) PROCESS macro (Model 4), with a 95% confidence interval based on 5000 bootstrap samples. The analysis results are presented in Table 3.

Table 3. Results of the Mediation Analysis Examining the Mediating Role of Self-Efficacy in the Relationship between Professional Learning and Organizational Learning

Path	Effect (B)	SE	%95 CI		Bootstrap %95 CI	
			LLCI	*ULCI*	*BootLLCI*	*BootULCI*
Total Effect (c): ***PL → OL***						
Professional Learning	.804***	0.071	.664	.944	—	—
Direct Effect (c'): ***PL → OL (controlling for self-efficacy)***						
Professional Learning	.686***	0.069	.551	.820	—	—
Indirect Effect: ***PL → SE → OL***						
Indirect Effect via Self-Efficacy	.118	0.032	—	—	.062	.186
Completely Standardized Indirect Effect (β)	.074	0.020	—	—	.039	.115

PL = Professional learning; SE = Self-efficacy; OL = Organizational learning; SE = Standard error; CI = Confidence interval. c = total effect; c' = direct effect. Confidence intervals were estimated using 5,000 bootstrap samples. An indirect effect is considered statistically significant if the bootstrap confidence interval does not include zero. ***p < .001.

An examination of Table 3 shows that including self-efficacy in the relationship between professional learning and organizational learning reduces the predictive effect of professional learning; however, this effect remains statistically significant ($c' = .686$, $p < .001$, 95% CI [.551, .820]). These findings suggest that teachers' professional learning is associated with organizational learning both directly and indirectly through self-efficacy. The analysis found that the indirect effect of self-efficacy on the relationship between these two variables is .118, with a 95% confidence interval of [.062, .186].

To examine the mediating role of self-efficacy in the relationship between teachers' professional learning and organizational learning, a mediation analysis was performed using bootstrap methodology, with results summarized in a table. The bootstrap analysis, conducted with 5000 resamples, included confidence intervals to evaluate the significance of the findings. The absence of zero within the confidence interval for the indirect effect indicates that the mediating effect is statistically significant.

Additionally, the effect size of the mediating variable shows that the fully standardized indirect effect is .074, with a 95% bootstrap confidence interval ranging from [.039, .115]. According to Gürbüz's (2019) criteria, since this value (.074) is close to the $K^2 = .09$ threshold, it suggests that self-efficacy has a moderate mediating effect on the relationship between professional learning and organizational learning.

Discussion

This study aimed to examine the impact of teachers' professional learning on organizational learning and the mediating role of self-efficacy in this relationship. The findings indicated that teachers' professional learning levels were moderate (M = 3.18), their self-efficacy levels were above moderate (M = 3.72), and their organizational learning levels were moderate (M = 3.26). The fact that teachers' professional learning levels were moderate (M = 3.18) indicates that teachers participate in professional development to a moderate extent. This suggests that teachers are receptive to professional learning, but the process itself may require further improvement. This finding may be associated with factors such as school conditions, environmental influences, the quality of relationships with school leaders and colleagues, and the tendency for professional learning efforts to remain primarily at the individual level. Additionally, schools may not provide sufficient support, learning opportunities may not be well-structured, or teachers' motivation for engaging in this process may be limited.

A review of the literature shows that Aslan et al. (2023) found teachers' professional learning levels to be high, while Cansoy (2025) demonstrated that teachers' professional development was occurring at a high level. This indicates that the literature reports findings at both moderate and high levels, suggesting that teachers' professional learning is a dynamic and context-sensitive process influenced by school characteristics and individual differences.

Another finding is that teachers' perceptions of organizational learning were at a moderate level (M = 3.26) indicates that knowledge sharing, a culture of collaborative learning, and organizational development processes occur to some extent within schools.This suggests that organizational learning is a developing characteristic rather than a fully established structure. While Kurt (2016) found organizational learning to be high in their study, Nural (2023) and Kabakkaya (2023) also reported high levels of teachers' organizational learning. These results imply that organizational learning varies across schools and is influenced by factors such as management philosophy, school culture, and the level of collaboration.

However, the finding that teachers' self-efficacy scores were higher than those of the other variables suggests that individuals' beliefs in their own capabilities remain relatively strong, regardless of their level of participation in professional and organizational processes. Based on these findings, it can be concluded that teachers' perceptions of self-efficacy are high. This indicates that although teachers have a high level of self-confidence personally, this does not necessarily translate equally into organizational and professional learning processes. This finding is consistent with Kurt (2016).

The results of the correlation analysis show positive and significant relationships between professional learning, self-efficacy, and organizational learning. This suggests that the examined variables are interrelated and may reinforce one another. The relationship between professional learning and organizational learning (r = .506) is stronger than the other relationships. This suggests that teachers' participation in professional development is associated with higher levels of organizational learning capacity and aligns with related research (Borko, 2004; Vescio, Ross, and Adams, 2008; Nural, 2023). Nural's (2023) study also identified a strong, positive, and significant relationship between organizational learning and professional learning community practices. From this, it is clear that active teacher engagement in professional learning significantly contributes to knowledge sharing and a culture of collaborative learning within schools.

There is a moderate correlation (r = .419) between self-efficacy and organizational learning. This suggests that as teachers' perceptions of self-efficacy grow, so does the level of organizational learning. It can be interpreted that teachers who believe strongly in their abilities at an individual level contribute more actively to developing a learning organization. Jaafari and Soleimani (2012) supported this relationship with their findings. Senge (2014), however, framed this relationship more broadly, emphasizing that professional learning activates a collective structure that combines teachers' individual skills and competencies.

The relationship between professional learning and self-efficacy was found to be positive but weak (r = .233). This relatively low correlation may be explained by the multidimensional nature of self-efficacy, which is shaped not only by professional learning experiences but also by additional sources such as mastery experiences, social interactions, and emotional states (Bandura, 1997).The findings of the present study are consistent with the existing literature. For instance, Cansoy et al. (2025) and Kılınç et al. (2021) reported significant relationships between professional learning and self-efficacy. Similarly, Anderson and Oliver (2022) emphasized that

professional learning communities contribute positively to both individual and collective efficacy, thereby supporting school development. In addition, Güzen (2020) identified positive and moderately significant relationships between organizational structures and learning processes. Overall, the literature conceptualizes the relationship between teacher professional learning and self-efficacy as reciprocal and mutually reinforcing, with self-efficacy functioning as an important predictor that enhances engagement in professional learning processes.

The multiple regression results indicate that professional learning and self-efficacy together account for 35.2% of the variance in organizational learning ($R^2 = .352$). Both variables significantly predict organizational learning, with professional learning emerging as the stronger predictor ($\beta = .431$). These findings suggest that teachers' practices, such as collaboration, reflection, and experience sharing, are associated with organizational learning processes (Liu et al., 2016). The significant predictive role of self-efficacy ($\beta = .318$) further indicates that teachers' beliefs in their own competence are associated not only with individual performance but also with organizational processes. This finding is consistent with the principle of triadic reciprocal determinism within Social Cognitive Theory (Pajares, 2002).

A key finding of the study is that self-efficacy partially mediates the relationship between professional learning and organizational learning. Bootstrap analysis demonstrated that the indirect effect is statistically significant (indirect effect = .118, 95% CI [.062, .186]) and that the mediation is partial, as the direct effect remains significant. The standardized indirect effect size (.074) indicates a small but meaningful mediating effect (Gürbüz, 2019). Partial mediation suggests that professional learning is associated with organizational learning both directly and indirectly. In other words, professional learning is associated with increased confidence in teachers' capabilities, which, in turn, is linked to greater engagement in organizational learning processes. This interpretation is supported by Lin et al. (2022) and Güzen (2020), who emphasize that individuals' perceptions of competence facilitate the transfer of professional gains to the organizational level.

Conclusions

This study examined the relationship between teachers' professional learning and organizational learning, as well as the mediating role of self-efficacy in this relationship, based on teachers' perceptions. The findings revealed significant positive relationships among professional learning, self-efficacy, and organizational learning. Moreover, both professional learning

and self-efficacy were identified as significant predictors of organizational learning. The primary finding of the study is that self-efficacy partially mediates the relationship between professional learning and organizational learning. These findings suggest that teachers' professional learning is associated with organizational learning both directly and indirectly through the enhancement of their self-efficacy beliefs.

Based on these findings, several implications can be drawn for practice and policy. First, it is important to promote practices that encourage teachers' active participation in professional learning processes. Second, establishing supportive and trust-based school environments is essential for strengthening teachers' self-efficacy perceptions. At the policy level, professional development initiatives may be designed with a comprehensive perspective that also supports the development of self-efficacy.

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CHAPTER 4

21st Century Transformation in Educational Sciences: Theoretical Approaches, Digitalization, and Future Perspectives

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Abstract

The 21st century is characterized as a dynamic period in which educational systems have undergone profound structural and functional transformation. Traditional teaching approaches have gradually been replaced by learner-centered, flexible, and technology-supported innovative educational models. This transformation has influenced not only instructional techniques but also theoretical perspectives on learning, teacher and student roles, and the formulation of educational policies.

Contemporary educational understanding is based on a learning process in which knowledge is not passively transmitted but actively constructed through learner participation. In this context, constructivist learning theory, socially based learning approaches, and digitally mediated learning experiences constitute the fundamental components of modern educational systems. In particular, the

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integration of technology into educational processes has diversified learning environments and extended education beyond the limitations of time and space.

This chapter examines the transformations in education within the framework of educational sciences from a multidimensional perspective. In addition to theoretical foundations, applied developments are also analyzed, focusing on the impact of digitalization in education, the restructuring of teaching processes, and the personalization of learning experiences. Furthermore, current issues such as educational equity, global interactions, and sustainability are discussed, and strategic recommendations for future educational systems are presented.

In conclusion, this study aims to demonstrate that the transformation in educational sciences is not merely a pedagogical shift but a multi-layered process deeply interconnected with social, cultural, and technological developments.

Keywords: Educational sciences, 21st-century skills, digital education, learning theories, teacher roles, educational policies

1. Introduction

Education has historically evolved through different paradigms shaped by social needs and intellectual developments, playing a fundamental role in the development of individuals and societies. The transition from agrarian societies to industrial societies, and subsequently to information- and technology-based societies, has led to radical changes in the aims, content, and methods of educational systems. Today, education is no longer limited to knowledge transmission; instead, it has evolved into a dynamic process that supports holistic human development and lifelong learning. In this context, individuals are expected not only to possess academic knowledge but also to demonstrate higher-order skills such as critical thinking, analytical problem solving, creativity, communication, and collaboration.

Rapid advances in digital technologies have significantly transformed the nature of educational processes. In particular, the widespread use of the internet and the development of mobile technologies have removed many time and space limitations in access to information. These developments have expanded learning environments beyond traditional classrooms, leading to the emergence of more flexible and individualized educational models through online platforms, open educational resources, and virtual learning environments. As a result, concepts such as personalization, flexibility, and accessibility have become increasingly important in education.

However, it is not always possible to argue that educational systems have adapted to these rapid changes at the same pace. In many institutions, traditional

teaching approaches still dominate. Rote learning, teacher-centered classroom structures, and limited interaction often restrict the development of skills required in the modern world. This situation limits the capacity of education systems to prepare individuals for an increasingly complex and rapidly changing global environment. Therefore, the development of innovative, flexible, and student-centered approaches in educational sciences, as well as the renewal of teaching methods and educational policies, has become a critical necessity.

2. Paradigm Shift in Education

The paradigm shift in education refers to the re-examination of fundamental assumptions underlying teaching and learning processes and their restructuring in accordance with contemporary needs. This transformation is not limited to superficial modifications in instructional methods but represents a comprehensive change that encompasses the aims, content, implementation processes, and assessment approaches of education. With the transition to a knowledge-based society, educational systems are expected not only to equip individuals with information but also to enable them to interpret, reconstruct, and adapt knowledge to new situations.

Traditional education is based on a teacher-centered structure in which the teacher occupies the central role and knowledge is transmitted in a one-way process. In this model, students are mostly passive recipients, and learning is primarily based on memorization of the presented content. While this approach allows for a certain level of knowledge transmission, it significantly limits the development of higher-order cognitive skills such as critical thinking, problem solving, and creativity.

In contrast, modern educational approaches emphasize active student participation in the learning process. In this perspective, learners are not passive receivers of information but active constructors of knowledge through their experiences and interactions. The teacher, in turn, acts as a facilitator, guide, and supporter of the learning process. This shift contributes to the creation of more interactive, participatory, and flexible learning environments.

The paradigm shift also introduces the idea that learning is not confined to classroom settings. Today, learning is considered a continuous process that occurs through out-of-school experiences, digital platforms, and social interactions. This requires educational systems to develop more flexible structures that consider individual differences and ensure inclusivity.

In conclusion, the paradigm shift in education represents a comprehensive transformation that redefines the learner's role, reshapes teaching approaches,

and makes educational systems more dynamic. This transformation is essential for preparing individuals with the skills required in the 21st century.

2.1 Traditional Educational Approach

The traditional educational approach has formed the foundation of many educational systems for decades and has played a decisive role in structuring teaching processes. In this model, teaching is largely based on a teacher-centered understanding in which the teacher is assigned the role of knowledge provider and transmitter. Students are positioned as passive participants who receive, repeat, and memorize the information presented to them.

In this approach, the learning process generally involves the systematic delivery of predefined content. Individual interests, learning pace, and different learning styles of students are often not sufficiently considered. This leads to a standardized structure of education and may result in the neglect of individual differences.

Communication in traditional education is predominantly one-directional. The teacher dominates classroom discourse, while students remain mostly listeners. This structure limits student participation and reduces interaction in the learning process. Moreover, skills such as questioning, discussion, and critical thinking are not sufficiently encouraged.

Regarding assessment, success is mainly measured by the ability to recall information accurately. Written exams and multiple-choice tests are commonly used as primary evaluation tools. However, such assessments may fail to fully capture students' abilities to understand, interpret, and apply knowledge in different contexts.

In conclusion, although the traditional approach has an important place in the history of education, it has limitations in meeting the learning needs of the modern era, particularly in developing higher-order thinking skills.

2.2 Modern Educational Approaches

Modern education views learning as a learner-centered, interactive, and continuously evolving process. In this approach, students are no longer passive recipients of information but active participants who research, question, and produce knowledge. Learning environments are redesigned to support this active role.

One of the key features of this approach is its student-centered nature. Students' interests, needs, learning pace, and individual differences are taken

into consideration in planning the educational process. This leads to a more personalized and flexible learning structure, which increases motivation and supports more permanent learning outcomes.

Active learning plays a central role in modern educational approaches. Students engage in discussions, problem-solving activities, project development, and collaborative work. Learning occurs through experience rather than passive reception, enabling deeper understanding and knowledge transfer across contexts.

This approach also promotes critical thinking skills. Students are encouraged to question information, evaluate different perspectives, and form their own conclusions. This enables individuals to develop more analytical and informed approaches not only in academic contexts but also in everyday life.

In conclusion, modern educational approaches transform learning from a static process into a dynamic, interactive, and learner-centered structure. This model plays a crucial role in developing the knowledge, skills, and attitudes required in the 21st century.

3. Learning Theories and Educational Sciences

Learning theories, which constitute the theoretical foundation of educational sciences, are scientific frameworks that aim to explain how individuals learn, how knowledge is acquired, processed, and transformed into behavior. These theories enable educational practices to be developed not only on intuitive bases but also on scientific foundations. Thus, teaching processes become more effective, systematic, and measurable.

In the 21st century, the scope of learning theories has expanded significantly and has taken on a more holistic structure. While traditional theoretical approaches mostly consider learning as a unidimensional process, contemporary educational understanding evaluates learning within cognitive, affective, and social dimensions. This reveals that learning is not merely an individual mental process but a dynamic structure shaped by environmental, social, and technological interactions.

In modern educational settings, learning theories are no longer treated as independent structures but as interrelated and complementary systems. For instance, approaches explaining cognitive processes are integrated with socially oriented learning theories, while constructivist perspectives support this holistic structure by emphasizing the active role of the learner. This integration contributes to more flexible and student-centered educational processes.

Furthermore, the integration of technology into education has transformed the application of learning theories. Digital learning environments enable individuals to learn at their own pace, access diverse resources, and engage in interactive experiences. This has extended learning beyond classroom boundaries and strengthened the concept of lifelong learning.

Learning theories are essential structures that form the theoretical foundation of educational sciences and guide educational practices. In the 21st century, these theories have gained a more comprehensive, interactive, and interdisciplinary perspective, playing a critical role in reshaping educational processes.

3.1 Behaviorist Theory

Behaviorist theory is an approach that explains learning through observable and measurable changes in an individual's behavior, holding an important place in educational sciences. According to this perspective, learning is considered a process shaped by responses to external stimuli rather than internal mental processes. Therefore, learning achievement is evaluated based on changes in observable behavior.

The foundation of this theory lies in the determining role of environmental factors in learning. Individuals acquire new behaviors through responses to stimuli, and these behaviors are strengthened over time through reinforcement mechanisms. In particular, feedback processes such as rewards and punishments increase the likelihood of desired behaviors while reducing undesired ones.

Reinforcement plays a critical role in the sustainability of learning in behaviorist theory. Positive reinforcement increases motivation and strengthens behavioral persistence, while negative reinforcement contributes to the elimination of certain behaviors. This process enables learning to be guided in a systematic and controlled manner.

However, focusing solely on observable behavior creates limitations in explaining deeper cognitive aspects of learning. Internal mental processes, meaning-making structures, and thinking mechanisms are not sufficiently addressed in this approach. Especially in complex learning situations, focusing only on external behavioral changes is not sufficient to explain the full nature of learning.

Although behaviorism provides important contributions to understanding basic learning mechanisms, it is no longer considered sufficient on its own in contemporary education and is more effectively used in combination with cognitive and constructivist approaches.

3.2 Cognitive Theory

Cognitive theory is an approach that explains learning through mental processes, focusing on how information is received, organized, stored, and retrieved when needed. This theory evaluates learning not only through external behavioral changes but also through internal cognitive processes.

Information processing is a central concept in this approach. The learner is seen not as a passive receiver of stimuli but as an active system that selects, interprets, and integrates information into existing cognitive structures. Therefore, learning involves processes such as attention, perception, encoding, and retrieval.

Attention and memory are key focus areas of cognitive theory. Attention determines which information is processed, while memory enables the storage of information in both short-term and long-term systems. Effective learning requires sustained attention and meaningful organization of information within memory structures, which is essential for long-term retention.

This theory also defines the learner as an active information processor. Students interpret new information by relating it to prior knowledge and continuously reorganize their cognitive structures. This perspective also highlights that learning may vary depending on individual experiences.

In this context, cognitive theory provides a strong theoretical framework for understanding learning processes in depth and contributes to designing educational practices that take students' mental processes into account.

3.3 Constructivist Approach

The constructivist approach is considered one of the most important learning theories forming the theoretical and practical foundation of contemporary education systems. It argues that knowledge is not a fixed structure transmitted directly to the learner but is actively constructed by the learner through a dynamic process. Therefore, learning is shaped by prior experiences, existing knowledge, and interactions with the environment.

According to this view, learning is built upon individual experiences. Students interpret new information by relating it to previous experiences and continuously reorganize their cognitive structures. Thus, learning becomes a productive process rather than passive knowledge transfer.

In constructivism, the learner is not a passive recipient but an active participant in the learning process. Students engage in activities such as research, inquiry, problem-solving, and collaboration, which leads to more

permanent learning outcomes. This process also supports the development of critical thinking and analytical skills.

The role of the teacher is redefined from knowledge transmitter to facilitator and guide. Teachers support students by creating appropriate learning environments and guiding their learning journey. This transformation leads to more flexible, interactive, and student-centered learning environments.

3.4 Social Learning Theory

Social learning theory is an important approach that emphasizes learning is not limited to individual cognitive processes but is also shaped through social interactions. According to this theory, learning is a dynamic process influenced by social structures, observed behaviors, and interactions with others.

Observation is considered a fundamental mechanism in this theory. Individuals acquire new knowledge and skills by observing the behaviors of others. In classroom settings, social environments, and daily life, models play a significant role in shaping learning processes. Thus, learning occurs not only through direct experience but also through observation of others' experiences.

Modeling behavior is one of the key components of social learning theory. Individuals imitate or internalize behaviors of role models they admire. Teachers, peers, and family members are especially influential during childhood and adolescence. Modeling involves not only imitation but also interpretation and adaptation of behaviors into personal structures.

Social learning theory also emphasizes that learning is more effective within a social context. Cooperative learning environments, group work, and interaction-based educational practices significantly enhance both academic achievement and social skills development.

4. Digitalization and Education

The development of digital technologies has led to fundamental transformations in education systems. In particular, online learning platforms have increased accessibility in education.

4.1 Digital Learning Environments

- Distance education systems
- E-learning platforms
- Virtual classrooms

These environments make the learning process independent of time and space.

4.2 Advantages of Technology

• Personalized learning opportunities

• Fast access to information

• Interactive content

4.3 Limitations of Technology

• Digital inequality

• Attention deficit

• Reduced face-to-face interaction

5. Transformation of the Teacher Role

The transformation occurring in 21st-century education systems has fundamentally redefined the role of the teacher. While in traditional education the teacher is seen as the primary authority and transmitter of knowledge, in modern educational approaches the teacher has become a guide who facilitates the learning process.

5.1 Traditional Teacher Role

In the traditional model, the teacher is:

• The source of knowledge

• The center of the classroom

• The creator of a passive student structure

This approach may limit students' critical thinking and problem-solving skills.

5.2 Modern Teacher Role

Today, the teacher is:

• A guide and facilitator

• A supporter of the learning process

• A professional who considers individual differences

In this context, teachers should:

• Be competent in technology use

• Implement innovative teaching methods

• Adopt a lifelong learning mindset

5.3 Teacher Competencies in the Digital Age

With digitalization, the competencies expected from teachers have expanded:

• Digital literacy

• Pedagogical technology integration

• Data-based assessment skills

• Ability to increase student motivation

These competencies require teachers to be not only knowledge transmitters but also learning designers.

6. Student-Centered Education Approach

Student-centered education refers to an approach in which the learner takes an active role in the learning process. In this model, students:

• Take responsibility for their own learning processes

• Construct knowledge

• Develop critical thinking skills

6.1 Active Learning

Active learning involves the direct participation of students in the learning process. These methods include:

• Discussion techniques

• Problem-based learning

• Project-based learning

6.2 Collaborative Learning

In this approach, students:

• Work in groups

• Achieve common goals

• Develop social skills

Research shows that collaborative learning increases academic achievement.

6.3 Personalized Learning

Each student has a different learning pace and style. Therefore:

• Personalized learning plans

• Adaptive learning systems

have gained importance.

7. Assessment and Evaluation Approaches

Assessment and evaluation processes in education have also undergone a significant transformation. Instead of traditional exam-focused evaluation, process-oriented approaches have become more prominent.

7.1 Traditional Assessment

• Multiple-choice exams

• Rote memorization-based measurement

• Outcome-oriented approach

7.2 Alternative Assessment Methods

In modern education:

• Performance tasks

• Portfolio assessment

• Self-assessment

• Peer assessment

are used.

7.3 Use of Technology in Assessment and Evaluation

With digital tools:

• Instant feedback is provided

• Student performance is monitored

• Data analysis can be conducted

This makes assessment processes more objective and comprehensive.

8. Equity and Access in Education

Equality of opportunity in education is one of the most important goals of modern education systems. However, with digitalization, new forms of inequality have emerged.

8.1 Digital Divide

- Differences in access to technology
- Internet infrastructure problems
- Socioeconomic inequalities

8.2 Inclusive Education

Inclusive education approach:

- Ensures access to education for all individuals
- Includes individuals with disabilities
- Considers diverse learning needs

8.3 Policy Recommendations

- Equality of opportunity in education should be increased
- Access to technology should be expanded
- Disadvantaged groups should be supported

9. Globalization and Education

Globalization directly affects education systems. The acceleration of information flow has contributed to the formation of international standards in education.

9.1 Global Competencies

Skills expected from individuals in the 21st century:

- Critical thinking
- Intercultural communication
- Problem-solving

9.2 International Education Policies

- Common curriculum studies
- Student exchange programs
- International assessment systems

10. Sustainable Education

Sustainable education is a holistic educational approach that aims not only to equip individuals with academic knowledge but also to raise them as active citizens who possess environmental, economic, and social responsibility awareness. This approach is based on developing a lifestyle that meets present needs without compromising the ability of future generations to meet their own needs.

Environmental awareness plays a central role in this approach. Individuals are expected to recognize that natural resources are limited, understand the importance of protecting ecosystems, and develop environmentally responsible behaviors. Concepts such as recycling, energy conservation, sustainable consumption, and respect for nature become essential components of educational processes.

In the economic dimension, sustainable education focuses on developing individuals' ability to use resources efficiently, avoid waste, and think long-term. This approach not only builds individual economic awareness but also contributes to societal development processes. The ability of students to evaluate the environmental and social impacts of economic decisions is an important aspect of this process.

From a social perspective, sustainable education aims to strengthen values such as justice, equality, and social solidarity. Developing an inclusive and responsible perspective that embraces differences plays a critical role in building a sustainable society. In this process, educational institutions evolve from being mere knowledge providers into key agents of social transformation.

Sustainable education also contributes to raising awareness of global environmental challenges. Issues such as climate change, depletion of natural resources, and environmental pollution require individuals to develop informed and responsible behaviors through education. Therefore, educational processes must focus not only on individual development but also on global responsibility.

10.1 The Relationship Between Education and Sustainability

The relationship between education and sustainability represents an important interaction field that enables individuals to develop a sense of responsibility toward both their environment and future generations. This relationship is not limited to theoretical knowledge transfer but also includes a value system that guides individuals' daily behaviors. The educational process serves as a fundamental tool in fostering a sustainable lifestyle understanding.

The protection of natural resources is one of the most important components of this relationship. Through education, individuals become aware that essential resources such as water, soil, energy, and air are not unlimited and develop awareness of their responsible use. This awareness is crucial for reducing waste, developing recycling habits, and preserving natural resources for future generations.

Environmental awareness lies at the center of sustainability education. Individuals are expected to recognize environmental problems, understand their causes, and take an active role in developing solutions. Developing sensitivity toward global issues such as climate change, environmental pollution, and ecosystem degradation is considered an important outcome of educational processes. Thus, individuals tend to exhibit more responsible and conscious environmental behaviors.

The social responsibility dimension refers to individuals taking responsibility not only for their own lives but also for the society in which they live. The educational process contributes to social cohesion by instilling values such as justice, equality, solidarity, and sharing. This approach enables individuals to grow as more responsible and active citizens at both local and global levels.

Within this framework, education is positioned not only as a tool for transferring knowledge but also as a fundamental process for developing behavior and values that support sustainability awareness.

10.2 Sustainability Practices in Education

Sustainability practices in education refer to a set of planned activities that support individuals in developing environmental awareness, social responsibility, and behaviors aimed at protecting natural resources. These practices integrate theoretical knowledge with real-life applications, making learning more permanent and behavior-oriented.

Green school projects play an important role in integrating sustainability into educational institutions. These projects aim to reduce schools' energy consumption, implement effective recycling systems, and adopt environmentally friendly practices. Students are actively involved in these processes, allowing them to directly experience environmental responsibility. Thus, schools transform from purely academic environments into structures that promote sustainable living culture.

Environmental education programs aim to strengthen individuals' relationship with nature and develop awareness of environmental issues. Through these programs, students receive comprehensive knowledge about ecosystem functioning, environmental pollution, and natural resource conservation. In addition, project-based and hands-on learning activities help students develop as individuals capable of producing solutions to environmental problems.

Social awareness activities are important initiatives that ensure sustainability awareness extends beyond the school environment. Campaigns, seminars, workshops, and social responsibility projects aim to reach different segments of society. These activities contribute to a broad transformation of awareness by making individuals more sensitive to environmental and social issues.

In this framework, sustainability practices in education represent a holistic approach that supports individuals in becoming not only knowledge-based but also environmentally conscious and socially responsible citizens at the level of attitudes and behaviors.

11. Discussion

The transformation occurring in educational sciences significantly affects the structure and functioning of education systems, bringing both new opportunities and various structural challenges. In particular, the integration of digital technologies into educational environments holds the potential to make learning processes more accessible and interactive; however, it also makes inequalities between different socioeconomic groups more visible. Inequalities in access to technological tools make it difficult for students to benefit equally from educational opportunities, directly affecting the principle of equity in education.

In addition, the teaching profession is being redefined through this transformation process. Teachers are no longer expected to be mere transmitters of knowledge; instead, they are expected to be professionals who can effectively use digital tools, design learning processes, and respond to diverse learning

needs. This situation requires teachers to engage in continuous professional development and increases the importance of in-service training programs.

Furthermore, in order for education systems to adapt to this rapid change, more flexible, innovative, and inclusive policy approaches are required. Instead of traditional structures, developing student-centered and technology-supported systems that can quickly adapt to changing conditions emerges as a critical necessity for improving educational quality. In this process, policymakers should consider educational transformation not only as a technical change but also as a holistic process with social and cultural dimensions.

12. Conclusion

This study has examined the transformation occurring in educational sciences in the 21st century from a multidimensional perspective and has revealed the structural and functional changes in education systems. The findings indicate that contemporary educational approaches are increasingly evolving toward structures that are more flexible, accessible, inclusive, and integrated with technological advancements. This transformation reshapes not only teaching methods but also the nature of learning processes and the roles of educational institutions.

Education is no longer viewed merely as a process of knowledge transmission but as a continuous learning process that holistically supports individuals' cognitive, affective, and social development. In this context, students are not expected to focus solely on academic achievement; the development of 21st-century skills such as critical thinking, problem-solving, communication, and digital literacy has become a fundamental objective. Thus, education becomes a dynamic structure that supports lifelong development.

However, in order for education systems to adapt to this transformation, significant policy-level adjustments are required. Updating curricula, improving teacher competencies, and strengthening technological infrastructure are among the key components of this process. Additionally, ensuring equal access to quality education remains a critical requirement for providing equal opportunities for all individuals.

In conclusion, the transformation in educational sciences clearly indicates that future education systems should move toward more innovative, inclusive, and student-centered structures. In this regard, education policies must be continuously redesigned in accordance with changing societal needs and technological developments.

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CHAPTER 5

From Policy to Practice and A Journey toward 'Real Math': Rethinking a National Curriculum from the Perspective of Realistic Mathematics Education

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Abstract

Realistic Mathematics Education (RME) is an instructional approach that aims to make mathematics meaningful within the context of real life, enabling students to conceptualize mathematical knowledge through guided reinvention by developing their own solution strategies and gradually transitioning to abstract concepts. In this study, the instructional activities in the middle school 5th-grade mathematics textbook published by the Ministry of National Education in 2024 were examined for their alignment with the RME approach. As one of the pioneering studies to holistically investigate the reflection of the Century of Turkey Education Model on mathematics textbook activities through the RME principles, this research presents significant findings for the improvement of instructional activities in mathematics. The fundamental principles of the RME approach include reality, level, interactivity, guidance, activity, and intertwinement. The study employed document analysis as a

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qualitative research design. The "Alignment with Realistic Mathematics Education Form" was utilized as the data collection tool, and data were gathered by examining the textbook activities through this instrument. The obtained data were analyzed using the content analysis technique. The findings indicate that the mathematical activities in the new curriculum are largely consistent with RME principles. However, it was found out that the interactivity and level principles are reflected to a more limited extent compared to other RME principles.

KEYWORDS: Realistic mathematics education, Century of Turkey education model, Mathematics curriculum, Realistics Mathematics Education principles

Introduction

Recent shifts in mathematics education have challenged behaviorist models of teaching, foregrounding instead constructivist perspectives that position learners as active participants in the production of mathematical meaning. In Türkiye, this pedagogical shift is reflected in the Türkiye Century Education Model (TCEM), which presents itself as a multidimensional, holistic, and student-centered national curriculum framework. Yet curriculum reform cannot be understood only at the level of policy discourse; it must also be examined through the pedagogical forms reflected in curriculum in practice. In this respect, textbooks are not merely instructional tools, but key mediators between official curriculum intentions and classroom practice. From this standpoint, Realistic Mathematics Education provides a productive theoretical perspective for examining the extent to which curriculum reform moves toward meaningful mathematics activities. By emphasizing mathematization through context, students' informal strategies, guided reinvention, and the progressive development of formal understanding, Realistic Mathematics Education offers more than a set of design principles; it also functions as a critical framework for questioning whether instructional materials genuinely support student-centered learning or merely reproduce the language of reform at a superficial level. Its core principles reality, activity, interaction, levels, intertwinement, and guidance make it possible to evaluate not only the pedagogical structure of textbook activities, but also the extent to which a national curriculum reform is realized in practice.

Accordingly, this study examines the instructional activities included in the 2024 5th Grade Middle School Mathematics Textbook published by the Turkish Ministry of National Education through the perspective of Realistic Mathematics Education. The study employs qualitative document analysis.

The activities were systematically analyzed using the Compatibility Form for Realistic Mathematics Education. The study aims to determine the extent to which these activities reflect the teaching and learning principles of Realistic Mathematics Education and to identify their shared pedagogical characteristics within this framework.

By exploring the relationship between curriculum policy and textbook practice, this study contributes to broader discussions on how national curriculum reforms are interpreted, mediated, and enacted through instructional materials. As one of the first studies to examine the TCEM through Realistic Mathematics Education perspective, it seeks not only to evaluate a newly introduced textbook but also to rethink the promises of curriculum reform in relation to the realities of mathematics teaching and learning. The findings suggest that the instructional activities reflect core principles of Realistic Mathematics Education to a partial extent rather than in a systematic and balanced manner. Although some activities promote student engagement and guided mathematical thinking, the use of meaningful real-life contexts and the progression from informal to formal mathematization appear to be limited.

Conceptual Framework

Mathematics has often been perceived by students as an abstract system of symbols that is disconnected from everyday life. In many traditional learning environments, students may know how to carry out mathematical procedures without understanding why they work, which weakens conceptual understanding and reduces the permanence of learning. In response to this problem, mathematics education has increasingly turned toward reform-oriented approaches that emphasize meaning making, reasoning, and active student participation rather than the mere transmission of rules and procedures (Brewer & Daane, 2002; Ellis & Berry, 2005).

One of the most influential responses to this need for reform is Realistic Mathematics Education (RME), an approach that emerged in the Netherlands and developed in close association with the Wiskobas movement and the work of Hans Freudenthal (Treffers, 1993; van den Heuvel-Panhuizen & Van Zanten, 2020). Rather than viewing mathematics as a fixed body of knowledge to be delivered to students, RME is grounded in the idea that mathematics should be experienced as a meaningful human activity (van den Heuvel-Panhuizen, 2019; van den Heuvel-Panhuizen & Drijvers, 2012). Over time, this approach has become widely recognized beyond the Netherlands and has influenced mathematics education research and practice in a variety of international

contexts (Hough & Gough, 2007; van den Heuvel-Panhuizen, 2019). A central premise of Realistic Mathematics Education is that mathematics must be meaningful to learners. In this approach, the term realistic does not refer only to the real world in a literal sense; it also includes situations that students can imagine, interpret, or experience as meaningful problem contexts (Gravemeijer, 2020; van den Heuvel-Panhuizen & Drijvers, 2012). Such contexts provide students with opportunities to engage in mathematization by organizing, representing, and interpreting situations mathematically (Larsen, 2018; van den Heuvel-Panhuizen & Drijvers, 2012).

The first major principle of RME is therefore the reality principle, which holds that mathematics instruction should begin with meaningful contexts connected to students' lived experiences or imaginable situations (Gravemeijer, 2020; van den Heuvel-Panhuizen & Drijvers, 2012). When students encounter mathematics through such contexts, mathematical ideas become more accessible and less dependent on memorized symbolism alone. The second principle is that instruction should build on students' prior knowledge, informal strategies, and intuitive understandings. RME assumes that students' early mathematical experiences form the foundation for more advanced and formal mathematical thinking. For this reason, teaching should take students' current understanding as its starting point and support them through guided reinvention and progressive mathematization (Gravemeijer, 2020; Treffers, 1993). The third principle is that learning activities should allow students to develop their own models, representations, and symbols. In solving realistic problem situations, students may use drawings, tables, diagrams, and other informal representations, which can gradually develop into more formal mathematical tools and symbols (Gravemeijer, 2020; Larsen, 2018; van den Heuvel-Panhuizen & Drijvers, 2012). In this sense, the goal of mathematics instruction is not to introduce formal symbolism first, but to help students construct meaning before moving toward increasingly abstract mathematical representations.

Teaching–Learning Process in Realistic Mathematics Education

In Realistic Mathematics Education (RME), the teaching–learning process begins where traditional instruction often ends. Rather than introducing mathematics through formal rules and symbolic procedures, RME starts from students' prior informal knowledge and from meaningful contextual problems drawn from everyday life or from situations that students can imagine and experience as real (Gravemeijer, 2020; van den Heuvel-Panhuizen & Drijvers,

2012). The central aim is to support students in moving progressively from informal understanding toward formal mathematical knowledge through processes of guided reinvention and progressive mathematization (Gravemeijer, 1999, 2020; Treffers, 1993).

Within this approach, students are expected to construct mathematical ideas actively rather than receive them passively. Trial-and-error, exploration, and informal solution strategies are considered valuable starting points for learning, because they enable students to make sense of mathematical situations in their own ways before moving to more formal procedures. In this process, the teacher plays an essential role by encouraging students, organizing productive learning environments, and providing guidance when necessary without taking over students' mathematical thinking (Solomon et al., 2021; Whitenack et al., 2001).

A key feature of RME is that students should be given opportunities to develop their own models and representations and to reinvent mathematical knowledge through meaningful activity (Gravemeijer, 1999, 2020). Drawings, tables, diagrams, and other informal representations can function as bridges between contextual problem situations and more formal mathematical concepts (Larsen, 2018; van den Heuvel-Panhuizen & Drijvers, 2012). Moreover, students are expected to discuss, compare, justify, and interpret their solution strategies so that mathematical meaning is negotiated socially as well as constructed individually (Solomon et al., 2021). Through this sequence, learners gradually shift from contextual and experience-based reasoning to abstract mathematical concepts and symbolic forms (Gravemeijer, 1999; Treffers, 1993).

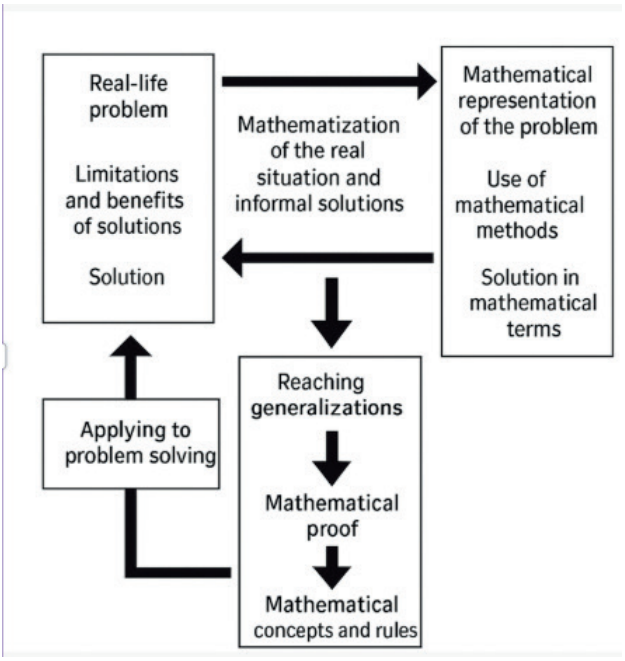

Figure 1. The learning cycle related to the RME approach (Olkun & Toluk Uçar, 2014).

Figure 1 reveals that the RME approach's learning cycle is a problem-solving process. The problem situation is expressed mathematically using mathematical symbols and diagrams, and the student attempts to solve the problem using these expressions, arriving at generalizations. At this stage, while accessing their own mathematical knowledge, the student applies the knowledge gained to solve another problem, thereby initiating a new learning cycle. The process continues with new learning (Gübbük, 2021).

The Fundamental Principles of Realistic Mathematics Education

Van den Heuvel-Panhuizen (2000) outlines the six fundamental principles of RME:

Figure 2. Six principles of Realistic Mathematics Education

Activity principle: The activity principle refers to students' engagement with problem situations that allow them to develop their own solution strategies through informal mathematical activity (Akyüz, 2010). From this perspective, mathematization is understood as a human activity (Can, 2012) in which learners organize, represent, and reinterpret situations mathematically (Freudenthal, 1973; Larsen, 2018). Therefore, the role of classroom tasks is not merely to practice procedures, but to create opportunities for students to think, explore, and gradually reinvent mathematics for themselves (Treffers, 1993; Gravemeijer, 1999).

Reality principle: The reality principle is one of the central foundations of RME. It suggests, first, that mathematics should help students deal with problems related to real life and, second, that instruction should begin from situations that are meaningful to students. In RME, the term realistic does not refer only to the real world in a literal sense, but also to situations that students can imagine, interpret, or experience as genuine problem contexts (van den Heuvel-Panhuizen & Drijvers, 2014; Gravemeijer, 2020). For this reason, teaching should start with rich contexts that require mathematical organization and that can function as a basis for conceptual development (Çilingir Altıner, 2021; Larsen, 2018; van den Heuvel-Panhuizen & van Zanten, 2020). Such contexts make mathematical ideas more accessible and support students in connecting school mathematics with meaningful experience (Treffers, 1993).

Level principle: The level principle concerns the idea that students pass through different levels of understanding while learning mathematics. In

RME, learning is seen as a gradual progression from informal, context-bound strategies to more formal, generalized, and abstract mathematical reasoning (Gravemeijer, 1999, 2020). During this process, students develop schematizations, shortcuts, and models that help them move from intuitive solutions toward more sophisticated forms of mathematical thinking (van den Heuvel-Panhuizen & Drijvers, 2014). This progression is often described as progressive mathematization, in which learners first work within meaningful situations and then gradually reorganize their thinking into formal mathematical structures (Freudenthal, 1973; Treffers, 1993). Accordingly, students' prior knowledge and readiness levels are crucial in designing appropriate RME activities (Demirdöğen, 2007).

Intertwinement principle: The intertwinement principle emphasizes that mathematical topics should be connected rather than taught as isolated and fragmented units. In RME, mathematical content is viewed as internally related, and learning activities are expected to promote connections across concepts, domains, and representations (Treffers, 1993; van den Heuvel-Panhuizen, 2019). As a result, solving a single activity may require students to draw on knowledge from multiple topics rather than apply a procedure from only one unit. This principle reflects the view that mathematics is a coherent and structured whole (Akyüz, 2010) and that meaningful learning depends on recognizing relationships within that whole (Gravemeijer, 2020; van den Heuvel-Panhuizen & Drijvers, 2014).

Interaction principle: The interaction principle highlights the social dimension of mathematics learning. In RME, learning mathematics is not only an individual cognitive process but also a social activity in which students explain, compare, discuss, and refine their strategies with others (Solomon et al., 2021). Classroom interaction is therefore essential, because it provides opportunities for students to communicate their discoveries, justify their reasoning, and reflect on alternative approaches (Whitenack et al., 2001; van den Heuvel-Panhuizen & Drijvers, 2014). However, interaction in RME does not imply that all students learn in the same way or reach the same level at the same time. On the contrary, individual differences are acknowledged, and the classroom functions as a collective learning community in which each student follows a personally meaningful path while participating in shared mathematical activity (Demirdöğen, 2007; Gravemeijer, 2020; Solomon et al., 2021).

Guiding Principle: This principle emphasizes the importance of guiding students in mathematics instruction in a way that allows them to discover mathematical concepts on their own. Teachers should accept students' informal

knowledge and solutions as a starting point and guide them so they can develop their own problem-solving strategies.

Mathematization in Realistic Mathematics Education

Freudenthal posits that mathematics originates from real-life situational problems and that formal mathematical knowledge is attained through the mathematization of reality. Freudenthal termed this process "mathematization" (Üzel, 2007). He emphasizes the significance of this process by asserting, "There is no mathematics without mathematization." This assertion is grounded in two primary reasons. First, mathematization is not an activity exclusive to mathematicians. Second, it is intrinsically linked to the concept of guided reinvention (Treffers, 1987; Altun, 2006; Özdemir & Üzel, 2011).

During the mathematization process within a mathematics lesson, a real-world problem is initially introduced. By expressing this problem using mathematical symbols, general formulas are derived to facilitate advanced mathematization. Ultimately, the objective is to ensure the retention of these formulas and rules by applying them to previously solved problems. This process can be conceptualized as an iceberg floating in the ocean for the concept of multiplication, or as a pyramid model for addition and subtraction. The aforementioned models are illustrated in Figure 3.

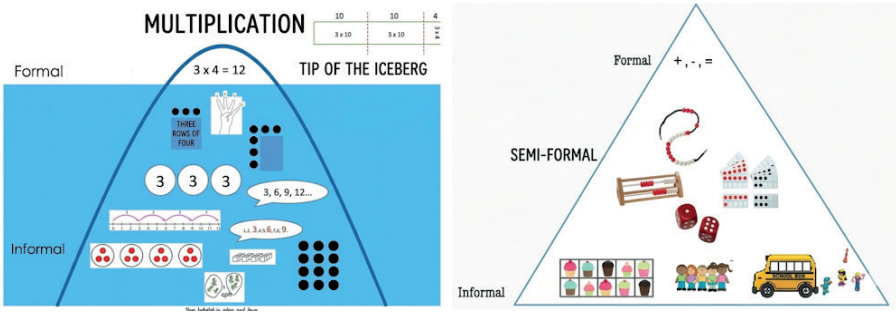

Figure 3. The iceberg model for multiplication and the pyramid model for addition and subtraction in the context of mathematization (Haji, 2013; as cited in Çilingir Altıner, 2021).

Figure 3 shows that the process begins with an informal representation, utilizes contextual objects, and progresses along a number line until the concept of multiplication is eventually formulated. At the base of the pyramid, the student initiates the learning process with a real-life problem situation by

utilizing visual aids and concrete materials, ultimately reaching the apex of the pyramid that is, formal mathematical knowledge independently. Freudenthal referred to this process as "mathematization." Freudenthal (1968, 1973, 1991) advanced the idea of approaching mathematics as a human activity within educational settings. At the foundation of the RME approach lies the objective of establishing a mathematics education that is accessible and comprehensible for all students (İşleyen, 2015). Altun (2008) illustrates the hierarchical ordering of RME and the constructivist approach according to Bloom's taxonomy, as depicted in Figure 4.

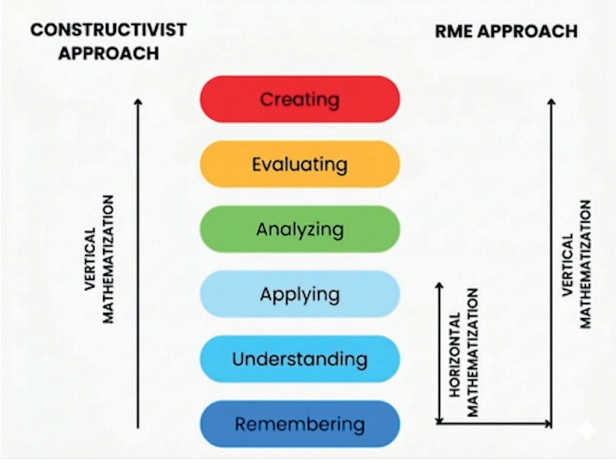

Figure 4. The hierarchical representation of RME and the constructivist approach according to Bloom's taxonomy (Altun, 2008).

According to the RME approach, activities initiate at the applying level—one of the stages in the hierarchy of Bloom's taxonomy, which includes remembering, understanding, applying, analyzing, evaluating, and creating. The process progresses first to the understanding level, then down to the initial remembering level, and subsequently cycles back through remembering, understanding, applying, analyzing, evaluating, and creating to engage in advanced mathematics. The applying level, where the teaching-learning process commences, constitutes a real-life problem; this phase, conducted with the aim of generating knowledge, is termed the horizontal mathematization process. Conversely, the progression that restarts from the remembering level in the hierarchy and ascends to the creating level is defined as the vertical mathematization process (Kaylak, 2014).

When examining the relationship between RME and the constructivist approach—two prominent paradigms wherein debates concerning the nature of mathematics and its pedagogy take shape—it becomes evident that they are parallel approaches, albeit with minor distinctions. These frameworks elucidate how mathematical knowledge is acquired and the cognitive activities involved during the learning process, rather than merely defining what mathematical knowledge is. In both theories, the primary emphasis lies not on the mathematical knowledge itself, but rather on the process of constructing and developing mathematical knowledge.

METHOD

This study was designed as document analysis- as a qualitative research method. Qualitative research methods include observation, interviews, and document analysis. In qualitative research, perceptions and events are examined realistically and holistically within their natural settings. In accordance with the purpose of the study, this methodological approach was chosen. Qualitative research designs guide the overall research process (Yıldırım & Şimşek, 2018). Predominantly, the term "text" in document analysis represents the scope of the data as primary data sources. Documents comprise audio recordings, visual records, and primarily artifacts characterized by written text (Scott, 1990). The fundamental objective of document analysis is to examine, comprehend, evaluate, and interpret documents (Sak et al., 2021). Merriam (2009) outlines the procedural steps of document analysis as identifying appropriate documents, verifying their authenticity, coding and cataloging, and conducting data analysis. Although there has been a recent increase in the number of studies utilizing document analysis, its prevalence remains lower compared to other methods (Haçat & Demir, 2018; Karamustafaoğlu & Değirmenci, 2018). Furthermore, document analysis is often undervalued compared to alternative methodologies or is utilized merely as a supplementary tool to support other methods (Mogalakwe, 2006).

The data source evaluated in this study consists of 112 instructional activities included in the 2024 middle school 5th grade mathematics textbook published by the Ministry of National Education. The "Realistic Mathematics Education Suitability Form" was used as data collection tool. The forms employed throughout the research were adopted from the study conducted by Ulutaş (2024).

Data Collection: The Realistic Mathematics Education Suitability Form

During the development of the "Realistic Mathematics Education Suitability Form," Ulutaş (2024) conducted a comprehensive document analysis encompassing field-specific theses, articles, and scientific studies. Utilizing the data obtained from this review, a draft form was developed based on the teaching and learning principles of RME as classified by Van den Heuvel-Panhuizen (2000). To ensure the content validity of the instrument, experts were consulted for their view. Accordingly, the prepared draft form was reviewed by five experts in the field of mathematics education, and feedback was collected. Taking these perspectives into consideration, the necessary revisions were implemented, and the final form was established (Ulutaş, 2024).

The activities found in the Ministry of National Education 5th grade middle school textbook examined in terms of RME principles was scored according to the RME suitability form. The suitability criteria pertaining to the activity principle within the form were grouped and coded as A5, A4, A3, A2, and A1; each activity was evaluated and scored within the framework of these categories.

Data Analysis

Researchers often prefer content analysis as data analysis method because it yields clear, objective, and robust findings. Fundamentally, it is a technique utilized to draw replicable and valid inferences from documentary data (Krippendorff, 2004). The analysis of the data obtained using the data collection tools was conducted through the content analysis method. The raw materials utilized in content analysis can encompass any form of communication, including written materials such as textbooks, novels, newspapers, and e-mail messages (Marshall & Rossman, 2006). In content analysis, similar data are gathered under specific concepts and categories, organized in a comprehensible manner, and interpreted .

Reliability

Reliability in document analysis pertains to the consistency of the findings; it indicates that another researcher following the same process could arrive at similar results. To ensure the reliability of the research, the procedure conducted in the study was replicated by two expert researchers in the field of mathematics using the two data collection tools. By comparing their results with the data collected by the researcher, the analysis of the obtained data was

refined to eliminate biases and misinterpretations (Cropley, 2023). The level of agreement between the expert's evaluation and the researcher's evaluation was determined using Cohen's kappa coefficient.

Regarding the interpretation of the agreement indicated by the Kappa value, the modes of interpretation based on Kappa coefficients are presented in Table 1, which was adapted from the study by Landis and Koch (1997) and Altman (1999).

Table 1. *Interpretation of the Kappa Coefficient*

Kappa Value	**Strength of Agreement**
<0,20	Poor agreement
0,21-0,40	Slight agreement
0,41-0,60	Moderate agreement
0,61-0,80	Good agreement
0,81-1,00	Almost perfect agreement

Based on Table 1 the Cohen's Kappa coefficients for the evaluations of the "Activity Evaluation Form," which were calculated using SPSS software, are presented in the table below. The Cohen's Kappa coefficients obtained from the SPSS analysis regarding the evaluation data of the "Realistic Mathematics Education Suitability Form" are presented in Table 2.

Table 2. *Cohen's Kappa Coefficients for the Realistic Mathematics Education Evaluation*

Principles	Activity principle	Reality principle	Level principle	Intertwinement principle	Interaction principle	The Guiding Principle
Kappa Value	0.818	0,754	0,767	0,774	0,812	0,823

Table 2 indicated that there is a good agreement between the evaluations of the expert and the researcher regarding the "Reality Principle," "Level Principle," and "Intertwinement Principle" among the RME principles. Furthermore, an almost perfect agreement is found regarding the "Activity Principle," "Interactivity Principle," and "Guidance Principle."

Research Ethics Approval

In this study, all rules stated to be followed within the scope of the "Higher Education Institutions Scientific Research and Publication Ethics Directive" were complied with. None of the actions specified under the title "Actions Contrary to Scientific Research and Publication Ethics", which is the second part of the directive, were carried out.

Ethical committee approval details: Name of the board conducting the ethical evaluation = Sinop University Human Research Ethics Committee (Sinop Üniversitesi İnsan Araştırmaları Etik Kurulu). Date of ethical evaluation decision = June 23, 2025. Ethical evaluation document issue number = Decision No: 2025/376 (Session Date: 23.06.2025, Session No: 6). *(Note: The ethics committee evaluated the research and officially decided that an ethics committee approval is not required for this study).*

FINDINGS

This section presents the evaluation results obtained from the analysis of the instructional activities included in the study, examined in accordance with the principles of Realistic Mathematics Education. The findings obtained from the examination of 112 instructional activities included in the textbook, conducted according to the RME teaching and learning principles—namely the activity, reality, level, intertwinement, interactivity, and guidance principles are presented in sequential order.

Findings regarding the activity principle: The 112 instructional activities addressed within the scope of the research were coded and classified under categories ranging from A1 to A5 within the framework of the RME activity principle. The findings obtained from the analysis based on the aforementioned principle are presented in Figure 4.1.

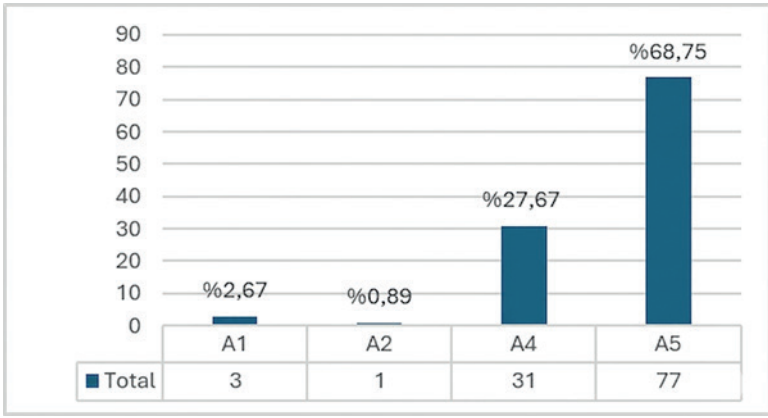

Figure 5. Distribution of the Instructional Activities According to Activity Principle of RME

As illustrated in Figure 5, among the activities examined according to the activity principle, 77 (68.75%) are in the A5 category and 31 (27.67%) are in the A4 category. There are no activities in the A3 category, while 1 (0.89%) activity is in the A2 category and 3 (2.67%) activities are in the A1 category.

Findings regarding the reality principle: The 112 instructional activities addressed in the research were evaluated within the context of the RME reality principle and classified by coding them under categories ranging from G1 to G5. The results of this examination based on the reality principle are presented in Figure 6.

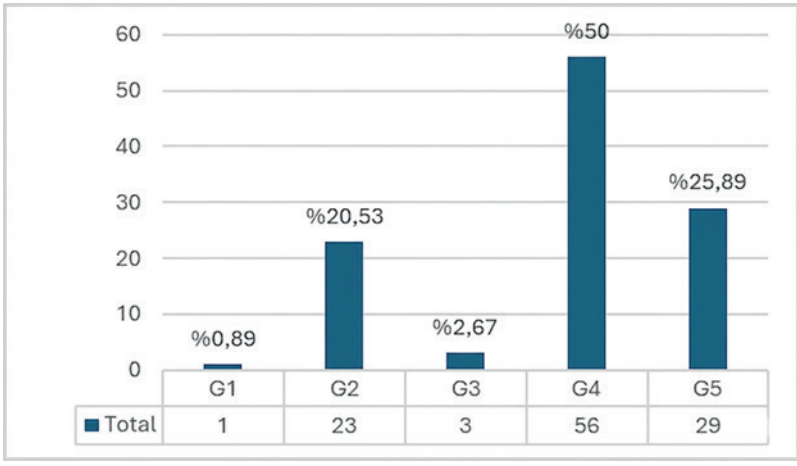

Figure 6. Distribution of the Activities Included in the Research According to RME Reality Principle Categories

When Figure 6 is examined, it is observed that among the activities analyzed according to the RME reality principle, 29 (25.89%) are in the G5 category, 56 (50%) are in the G4 category, 3 (2.67%) are in the G3 category, 23 (20.53%) are in the G2 category, and 1 (0.89%) is in the G1 category.

Findings regarding the level principle: The 112 instructional activities addressed within the scope of the research were coded and classified into categories in accordance with the RME level principle ranging from S1 to S5. The results of this analysis based on the level principle are presented in Figure 7.

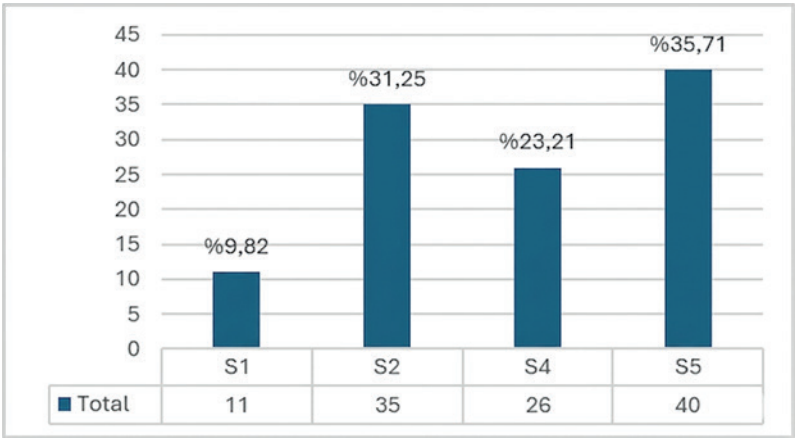

Figure 7. Distribution of the Activities Included in the Research According to RME Level Principle Categories

When Figure 7 is examined, it is observed that among the activities analyzed according to the level principle of Realistic Mathematics Education, 40 activities (35.71%) are in the S5 category, 26 (23.21%) are in the S4 category, 35 (31.25%) are in the S2 category, and 11 (9.82%) are in the S1 category. There are no activities in the S3 category.

Findings regarding the ıntertwinement principle: The 112 instructional activities addressed within the scope of the research were analyzed within the context of the RME intertwinement principle and classified using the codes B1, B2, B3, and B4. The results of the examination based on the aforementioned principle are presented in Figure 8.

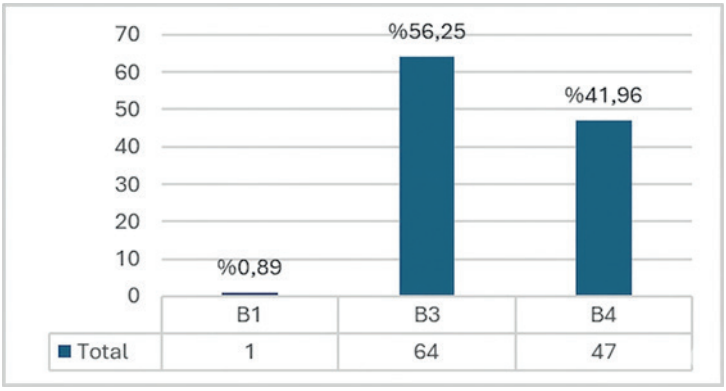

Figure 8. Distribution of the Activities According to RME Intertwinement Principle

When Figure 8 is examined, it is observed that among the 112 instructional activities analyzed according to the RME intertwinement principle, 47 activities (41.96%) are in the B4 category, 63 (56.25%) are in the B3 category, and 1 (0.89%) is in the B1 category. However, there are no activities in the B2 category.

Findings regarding the ınteractivity principle: The activities within the scope of the research were analyzed in accordance with the RME interactivity principle and coded under categories ranging from E1 to E5. The results of the evaluation conducted within the framework of this principle are presented in Figure 9.

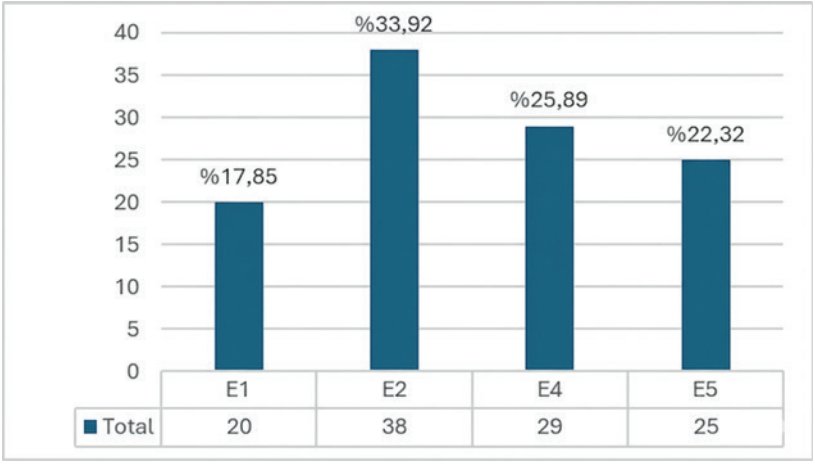

Figure 9. Distribution of the Activities According to RME Interactivity Principle

While evaluating the 112 instructional activities according to RME interactivity principle, explanations regarding in-class interaction during the implementation process of the activities were taken into account. As illustrated in Figure 9, among the activities, 25 (22.32%) are in the E5 category, 29 (25.89%) are in the E4 category, 38 (33.92%) are in the E2 category, and 20 (17.85%) are in the E1 category. There are no instructional activities in the E3 category.

Findings regarding the guidance principle: The 112 activities analyzed according to the guidance principle of RME were classified using the codes R1, R2, R3, R4, and R5. The analysis results are presented in Figure 10.

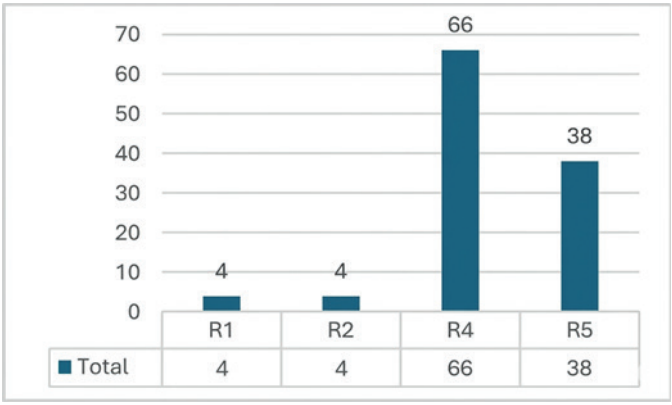

Figure 10. Distribution of the Activities According to Guidance Principle of RME

A holistic approach was adopted in the analysis of the activities within the context of the guidance principle. In this process, both the practical explanations and the guidance instructions given as a part of activity were addressed together. As illustrated in Figure 10, among the 112 instructional activities analyzed, 38 activities (33.92%) are in the R5 category, 66 (58.92%) are in the R4 category, 4 (3.57%) are in the R2 category, and 4 (3.57%) are in the R1 category. There are no instructional activities in the R3 category.

DISCUSSION

In this study, instructional activities included in the 2024 fifth-grade middle school mathematics textbook prepared within the scope of the Türkiye Century Education Model were analyzed according to the teaching-learning principles of Realistic Mathematics Education. This discussion does not view the textbook merely as a pedagogical resource; rather, it considers the textbook

as a key site where curriculum policy is translated into classroom practice. This perspective is important because curriculum reforms are not enacted only through official policy documents, but through the instructional materials that shape students' opportunities to learn mathematics in classrooms (Choppin et al., 2022; Johansson, 2005; Rezat et al., 2021). From this point of view, the findings of the present study make it possible to examine the extent to which the pedagogical intentions of the TCEM are realized through textbook activities, and whether these activities reflect the principles of Realistic Mathematics Education in a substantive rather than rhetorical sense (Freudenthal, 1991; Gravemeijer, 2020; van den Heuvel-Panhuizen & Drijvers, 2014).

A Journey to 'Real Math' Rethinking a National Curriculum from the Perspective of Realistic Mathematics Education

The 112 instructional activities were analyzed from the perspective of RME and its teaching-learning principles defined by Van den Heuvel-Panhuizen (2000). During this process, the extent to which the activities aligned with these principles and their general characteristics were identified.

This pattern suggests that, at the level of textbook design, the TCEM reflects several core features associated with Realistics Mathematics Education, particularly student activity, contextualization, connectedness, and guidance. However, the findings indicate that the move from policy to practice is uneven, since the interaction principle appears less consistently represented than the other principles. In this sense, the textbook reflects an important step toward "real math," but not yet a fully balanced enactment of the pedagogical vision implied by Realistic Mathematics Education (Freudenthal, 1973, 1991; Gravemeijer, 1999, 2020; Treffers, 1993).

Discussion of the activity principle: The findings indicate that the new mathematics curriculum demonstrates a very high level of alignment with the activity principle, as 77 activities (68.75%) were classified in A5 and 31 activities (27.67%) in A4. This means that most activities position students as active participants and provide opportunities to use materials, produce informal strategies, and develop their own models and structures. Such a pattern is highly consistent with the central assumption of Realistic Mathematics Education that mathematics should be experienced as a human activity, not as a body of ready-made rules to be transmitted by the teacher (Freudenthal, 1973; Gravemeijer, 2020; van den Heuvel-Panhuizen & Drijvers, 2014). In RME, mathematization is possible only when students are allowed to engage in meaningful mathematical activity, explore situations, test ideas,

and gradually reinvent mathematical concepts for themselves (Freudenthal, 1991; Treffers, 1993).

At the same time, the findings imply that distinction between A5 and A4 is theoretically important. While A5 activities create room for genuine student production and discovery, A4 activities appear to maintain student participation without fully supporting independent conceptual reinvention. In other words, students may remain active, but the pedagogical structure may still direct them toward predetermined outcomes too quickly. This distinction is crucial for the title's policy-to-practice focus: although the TCEM appears to promote active learning at the policy level, the enactment of this principle in textbook practice varies in depth. Thus, the new curriculum seems to adopt the language of reform strongly, but the extent to which students are positioned as full mathematical sense-makers differs across activities (Choppin et al., 2022; Rezat et al., 2021).

Discussion of the reality principle: The findings also indicate a high level of alignment with the reality principle, with 29 activities (25.89%) in G5 and 56 activities (50.00%) in G4. These results suggest that the majority of the activities begin from meaningful contexts, including both real-life situations and imaginable problem contexts. This is significant because, in Realistic Mathematics Education, the term realistic does not simply mean "taken from everyday life" in a literal sense; rather, it refers to situations that students can experience as meaningful and mentally accessible (Gravemeijer, 2020; van den Heuvel-Panhuizen & Drijvers, 2014). Meaningful context is therefore not a decorative feature of a task, but the starting point of mathematization (Freudenthal, 1973; Larsen, 2018).

The stronger G5 activities are especially important in relation to this research, because they demonstrate how a national curriculum reform may move toward "real math" when policy intentions are transformed into tasks that invite students to organize their learning experiences mathematically. These activities support the transition from context to model and from model to formal understanding, which is central to the RME perspective (Gravemeijer, 1999, 2020). By contrast, the G4 activities indicate that although context is present, the mathematical process often begins with quantitative or formalized expressions too early. This may limit students' opportunities for horizontal mathematization, that is, their ability to move from an experientially real situation into mathematical organization through their own reasoning (Treffers, 1993; van den Heuvel-Panhuizen, 1996). From a policy-to-practice perspective, this means that the TCEM's emphasis on meaningful, contextualized learning

is visible in the textbook, but not always realized in its strongest pedagogical form.

Discussion of the level principle: The results related to the level principle show a more mixed but still positive pattern. A total of 40 activities (35.71%) were classified as S5 and 26 activities (23.21%) as S4, while 35 activities (31.25%) were in S2 and 11 activities (9.82%) in S1. This suggests that the new curriculum often supports students' progression across levels of understanding, but not consistently across all activities. In RME, learning mathematics means moving through different levels from informal, context-based reasoning to more formal, generalized, and abstract mathematical understanding (Freudenthal, 1991; Gravemeijer, 1999; van den Heuvel-Panhuizen & Drijvers, 2014). Models play a bridging role in this process, allowing students to transform personal strategies into more formal mathematical reasoning (Gravemeijer, 1999; Streefland, 1994).

The S5 activities in particular appear to reflect this principle well, because they allow students to mathematize situations using prior knowledge, organize their own solution strategies, and refine their models through appropriate support. This is closely aligned with the core RME movement from model-of a situation toward model-for mathematical reasoning (Gravemeijer, 1999). However, the presence of a substantial number of S2 and S1 activities suggests that this developmental trajectory is not fully systematic throughout the book. Therefore, while the textbook reflects the curriculum reform's intention to support conceptual development, the realization of that intention is stronger in some activities than in others. This again reinforces the title's central argument: the journey from curriculum policy to "real math" is visible, but incomplete.

Discussion of the intertwinement principle: The findings show a very strong alignment with the intertwinement principle, with 47 activities (41.96%) in B4 and 63 activities (56.25%) in B3. Only one activity was classified at the lowest level. This suggests that the majority of the textbook activities in new curriculum are designed to connect mathematical concepts, skills, representations, and learning areas rather than presenting mathematics as fragmented content. Such a pattern is highly compatible with the RME view that mathematical ideas should not be treated as isolated units, but as related components of a coherent whole (Treffers, 1993; van den Heuvel-Panhuizen, 2019; van den Heuvel-Panhuizen & Drijvers, 2014).

This finding is also highly relevant to the national-curriculum dimension of research. Curriculum reform often claims to foster holistic learning, but textbooks may still reproduce compartmentalized structures. In this case, however, the analysis suggests that the textbook largely succeeds in building

intra-mathematical and cross-domain connections. That is an important sign that the TCEM's policy discourse is not merely symbolic, but is translated into activities that support more integrated mathematical thinking. In this respect, the textbook seems to move beyond procedural fragmentation and toward the relational structure advocated by Realistic Mathematics Education (Gravemeijer, 2020).

Discussion of the interaction principle: Among all principles, the interaction principle appears to be the least strongly represented. Although 25 activities (22.32%) were classified in E5 and 29 activities (25.89%) in E4, 38 activities (33.92%) fell into E2 and 20 activities (17.85%) into E1. These findings indicate that the overall alignment of the textbook with the interaction principle is only moderate. This is significant because, in RME, mathematics learning is understood not only as an individual cognitive process but also as a social activity in which students compare strategies, justify solutions, negotiate meanings, and refine ideas collectively (Pijls & Gravemeijer, 2002; Solomon et al., 2021; Whitenack et al., 2001). Classroom discussion and collaboration are essential for enabling students to become participants in mathematical practice rather than isolated problem solvers (Gravemeijer, 2020; van den Heuvel-Panhuizen & Drijvers, 2014).

From the perspective of your title, this is perhaps the clearest indication that the transition from policy to practice remains partial. Even if a curriculum promotes student-centered and meaning-oriented learning, such a vision cannot be fully realized without opportunities for social interaction. The new curriculum appears more successful in supporting individual activity than collective mathematical discourse. Therefore, while the TCEM may rhetorically align with contemporary reform principles, the weaker presence of interaction suggests that the practice of "real math" still requires stronger attention to collaborative meaning-making and whole-class discussion.

Discussion of the guidance principle: The textbook shows a very high degree of alignment with the guidance principle, with 38 activities (33.92%) in R5 and 66 activities (58.92%) in R4. This indicates that most activities are structured in ways that support students' thinking through prompts, questions, planned transitions, and teacher support. This finding is particularly important in RME, because guided reinvention is one of its foundational ideas: students are expected to reinvent mathematics, but this process does not occur without carefully designed guidance and instructional orchestration (Freudenthal, 1991; Gravemeijer, 2020; Treffers, 1993). The role of the teacher is not to transmit end-user knowledge directly, but to create conditions in which students can

construct meaning while receiving timely support (Streefland, 1985; van den Heuvel-Panhuizen & Drijvers, 2014).

The strong performance of this principle suggests that the textbook effectively supports one of the most critical bridges between reform discourse and classroom enactment. In other words, the new curriculum does not merely encourage activity; it also provides scaffolding for students' mathematical development. This is especially relevant because it shows that the national curriculum reform is not only visible in thematic or rhetorical terms, but is partly embedded in the pedagogical structure of the activities themselves.

Overall interpretation: Taken together, the findings indicate that the 2024 5th grade mathematics textbook in new curriculum reflects many of the core ideas associated with Realistic Mathematics Education, particularly in relation to activity, reality, intertwinement, and guidance. This suggests that the textbook functions as an important medium through which the TCEM's reform-oriented policy discourse is transformed into pedagogical practice. In this sense, the textbook represents a meaningful journey toward "real math". However, the findings also show that this journey is not fully complete. The relatively weaker representation of the interaction principle, along with variation in the depth of implementation of the level and reality principles, indicates that the transition from national curriculum vision to classroom-oriented task design is uneven rather than uniform. Therefore, from the perspective of Realistic Mathematics Education, the textbook in new curriculum may be regarded not as the full realization of reform, but as a significant and promising step in the ongoing process of rethinking how a national curriculum is enacted in practice in terms of RME (Choppin et al., 2022; Johansson, 2005; Rezat et al., 2021).

Conclusion

The analysis of 2024 5th grade middle school mathematics textbook suggests that the principles of Realistic Mathematics Education are largely present, although not equally across all dimensions. The findings indicate that the six principles are deeply interconnected: meaningful contexts support activity; activity supports model development; model development supports progressing across levels; intertwinement strengthens conceptual coherence; interaction enriches meaning-making; and guidance makes reinvention possible. For this reason, the principles should not be treated as isolated categories, but as mutually reinforcing dimensions of mathematically meaningful instruction (Freudenthal, 1991; Gravemeijer, 1999, 2020; van den Heuvel-Panhuizen & Drijvers, 2014).

Accordingly, this study concludes that the maths textbook in new curriculum is largely aligned with the pedagogical orientation of Realistic Mathematics Education, with the notable exception that interaction is less strongly represented than the other principles. This means that the TCEM's policy vision is visibly reflected in textbook practice, but the movement from policy to practice remains partial and developmental. The textbook points toward "real math," yet the full realization of that journey depends on a more balanced integration of all RME principles, especially those that support social mathematical discourse and collective meaning-making.

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CHAPTER 6

The Effectiveness of a Game-Based Intervention in Fostering Sustainability Consciousness Development: A Mixed-Methods Study[1]

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Abstract

This study examined the impact of a game-based application developed to enhance students' consciousness of the Sustainable Development Goals (SDGs). The research was conducted using a mixed-methods design that combined quantitative and qualitative research methods. The study included 53 high school students selected using a convenience sampling method. The study was designed in two phases: in the first phase, a game-based learning tool was developed, and in the second phase, the impact of the developed game on students' sustainability consciousness was examined. Data collection tools included the Sustainability Consciousness Questionnaire, an interview

1 This study was prepared based on a project conducted by the second and third authors under the supervision of the first author as part of the 57th 2204-A High School Students' Research Projects Competition organized by TÜBİTAK, and presented at the regional finals on February 9–12, 2026.

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form, and field notes. Paired samples t-tests were used for the analysis of quantitative data, while descriptive and content analysis methods were used for the analysis of qualitative data. The findings indicated a statistically significant increase in students' sustainability consciousness scores in favor of the post-test. Based on students' feedback, the following themes were identified: "emotions," "cognitive learning," "SDG awareness," "social interaction," and "dissemination." The qualitative findings revealed that the developed game enhanced students' awareness of the Sustainable Development Goals, improved their learning motivation, strengthened social interaction, and contributed to their ability to relate sustainability concepts to daily life. At the conclusion of the study, it was concluded that the game developed serves as an innovative and practical educational model for fostering students' sustainability consciousness.

Keywords: Sustainable Development Goals (SDGs), Sustainability Consciousness, Game-Based Learning.

1. Introduction

In the Brundtland Report, the concept of sustainability is defined as meeting the needs of the present without compromising the ability of future generations to meet their own needs (The World Commission on Environment and Development [WCED], 1987). In general terms, sustainable development emphasizes the need to pursue three elements -development, ecology, health, social equity, and economic well-being- in a balanced manner (Emina, 2021). In fact, this concept has gained a new intellectual dimension in the contemporary scientific world (Dennis, 2020). Furthermore, it has become one of the most debated topics worldwide in recent times (Çetinkaya et al., 2023). There are numerous environmental issues in the world. These environmental issues also have ecological, economic, cultural, social, and political dimensions (Çetinkaya et al., 2023). Although the concept of sustainability is related to the environment, it is insufficient to associate it solely with the environment. This is because the concept of sustainability encompasses many areas, including environmental issues, global warming, climate change, various forms of energy use, justice, hunger, equality, health, the depletion of natural resources, urbanization, and more.

Sustainable development, in addition to being an ever-evolving topic, can lead to changes in societal behaviors and institutions that aim to balance the social, economic, and environmental dimensions of development (Serafini et al., 2023). The 2030 Agenda for Sustainable Development, adopted by the leaders of 193 countries at the United Nations General Assembly (UNGA), establishes a new global framework to guide humanity toward a sustainable

path (Serafini et al., 2023). This framework consists of 17 goals, 169 targets, and 232 indicators (Biermann et al., 2022; Serafini et al., 2023). The United Nations established the Sustainable Development Goals (SDGs) to guide global development efforts between 2015 and 2030 (Ha et al., 2023). The Sustainable Development Goals (SDGs) are a global call to action aimed at protecting the environment, combating climate change, eradicating poverty, and improving the quality of life and achieving well-being for all humanity (Mishra et al., 2024).

Sustainable Development Goals (SDGs)
1. No Poverty
2. Zero Hunger
3. Good Health and Well-being
4. Quality Education
5. Gender Equality
6. Clean Water and Sanitation
7. Affordable and Clean Energy
8. Decent Work and Economic Growth
9. Industry, Innovation and Infrastructure
10. Reduced Inequalities
11. Sustainable Cities and Communities
12. Responsible Consumption and Production
13. Climate Action
14. Life Below Water
15. Life on Land
16. Peace, Justice and Strong Institutions
17. Partnerships for the Goals

Fig. 1. United Nations Sustainable Development Goals (SDGs)

The Sustainable Development Goals, established by the United Nations, aim to end poverty and hunger, ensure good health and well-being, provide quality education, achieve gender equality, ensure access to clean water and sanitation, promote affordable and clean energy, foster decent work and economic growth, and advance industry -innovation and infrastructure, reduced inequalities, sustainable cities and communities, responsible consumption and production, climate action, life below water, life on land, peace, justice, and strong institutions, and partnerships for the goals (Figure 1). These goals aim to create a more livable world by addressing social, environmental, and economic sustainability through a holistic approach.

It may be unwise to make definitive statements or predictions about what the future holds for future generations. We must begin considering the daily lives of future generations now. It is essential to chart roadmaps to make their future living conditions more livable. Sustainable development aims to ensure the living conditions of future generations. Consequently, sustainable development has become an integral part of all daily life activities and assessments due

to the critical role it plays in shaping the future (Akinsemolu and Onyeaka, 2025). We have no other place to live besides this planet. Therefore, taking care of this planet plays a critical role for our future. The future of this planet depends on ensuring the successful achievement of humanity's development goals (Moallemi et al., 2020). The decisions humanity makes today regarding development will evolve into a framework that determines the quality and nature of life in the future. The establishment of peace and prosperity in the future depends on the decisions made today. Countries must implement policies and structural reforms in this regard. Of course, global policies and structural reforms alone are insufficient to achieve sustainable development goals. Additionally, fostering individuals' knowledge, attitudes, and behaviors regarding sustainable development will play a significant role. In this context, individuals' sustainable consciousness is becoming increasingly important.

As part of their research at Karlstad University in Sweden, a research group employed the concept of "sustainability consciousness" to holistically capture individuals' knowledge, attitudes, and behaviors regarding the social, economic, and environmental dimensions of sustainability (Kalsoom and Khanam, 2017). Sustainability consciousness (SC) is a key determinant of the success of sustainability-related initiatives (Gulzar et al., 2023). Sustainability consciousness is defined as experience or awareness regarding sustainability issues (Gericke et al., 2018). In this context, sustainability consciousness emerges as a multidimensional structure encompassing individuals' awareness of sustainability in their daily lives and their overall quality of life. This consciousness forms a crucial foundation for individuals to develop awareness and sensitivity toward the Sustainable Development Goals (SDGs). To translate this awareness into action, individuals must correctly interpret the environment. In this regard, developing individuals' ecological literacy skills is of vital importance. Ecological literacy refers to the ability to develop environmentally conscious behavior by understanding the human-nature relationship within an individual's interaction with nature. This concept has become particularly important due to the challenges posed by the Industrial Revolution and the climate crisis (Dündar and Kızık, 2022). Ecological literacy is one of the essential skills that people should possess. One of the key objectives of educational systems is to cultivate ecologically literate individuals. An ecologically literate individual is someone who is aware of human behaviors that impact the environment, makes conscious decisions to protect nature, exhibits cognitive and emotional attitudes and behaviors toward the environment, and develops a sense of responsibility for environmental protection. Unfortunately, our planet is increasingly being degraded as a result of human impacts (Okyay et al., 2021). Consequently, fostering individuals who question human behaviors harmful

to the environment and are environmentally conscious has become critical in this regard. Developing ecologically literate individuals has become one of the inevitable goals of education. Indeed, ecological literacy is inextricably intertwined with participation in educational practices at specific times and places (Persson et al., 2022). In the future, eco-literacy will play a vital role in humanity's survival and development (Ha et al., 2023). Consequently, countries can ensure the cultivation of such individuals through appropriate and effective educational programs.

Literature Review on Sustainable Development and SDGs Education

Research on sustainable development is increasingly focusing on individuals' perceptions, awareness, and attitudes toward sustainability. Previous studies have shown that students generally conceptualize sustainable development primarily through its environmental dimension, emphasizing topics such as environmental protection, recycling, and preserving ecological balance (Demir and Atasoy, 2021). Similarly, intervention-based studies have shown that innovative teaching approaches, such as STEAM education, can positively influence students' understanding of sustainability (Biçer, 2024). Studies conducted with pre-service teachers also indicate a relatively high level of sustainability awareness, particularly regarding environmental, social, and economic dimensions (Torun, 2024). However, current research is largely descriptive in nature and tends to focus on specific demographic variables such as grade level, parental education, or socio-economic status (Ada et al., 2023). Additionally, there are studies that emphasize curriculum analysis or teacher perspectives rather than directly examining student-centered interventions (Azrak, 2022). This situation indicates that the number of experimental or intervention-based studies aimed at enhancing sustainable consciousness through innovative teaching methods is limited.

Research on the Sustainable Development Goals (SDGs) similarly highlights significant gaps. Studies show that students' awareness of the SDGs is generally limited and fragmented (Yuan et al., 2021), and that even when students possess basic knowledge, their ability to translate this knowledge into practice remains insufficient (Ilham et al., 2021). Furthermore, many studies have focused on higher education contexts -particularly university students or professional groups- rather than younger students (İlaslan et al., 2022). Some studies have primarily examined the alignment of the curriculum with the SDGs or sustainability concepts (Kardaş İşler, 2023; Yalçın, 2022; Ölçer and Öztürk, 2025). These studies indicate that while educational programs are structurally

aligned with sustainability goals, the in-depth and practical implementation of these goals in classroom settings remains limited. Similarly, studies evaluating educational programs show that sustainability-related content is generally not sufficiently integrated into teaching practices (Tosun and Gökçe, 2023). In addition to studies that enhance knowledge and awareness of sustainable living among school counselors (Örerel and Kağnıcı, 2024), , as well as studies examining university students' awareness of gender equality (Kartalkaya and Küçüksaraç, 2025) and the impact on middle school students' awareness of sustainable living (Koçulu, 2025).

The Importance and Purpose of the Study

In general, the literature indicates a critical gap in research focused on developing sustainable consciousness through student-centered, interactive, and practice-based approaches, particularly at the secondary education level. Furthermore, studies integrating game-based learning with education on the Sustainable Development Goals (SDGs) are insufficient. Therefore, this study aims to address this gap by developing and evaluating a game-based intervention designed to enhance sustainable consciousness. A review of the literature revealed that most studies on SDG awareness have been conducted with university students, while knowledge at the high school level remains much more superficial. Studies conducted in Turkey, on the other hand, have primarily focused on analyzing curricula; furthermore, it was determined that there are few studies addressing human-centered approaches, and existing studies have predominantly focused on middle school students as their sample. No applied research has been found in the literature that tests the development of sustainable consciousness among high school students by linking the game-based learning approach with the SDGs. Therefore, there is no doubt that the game-based educational application developed in this study will fill an important gap in the literature, both as an original ESD-based instructional material and as a scientific examination of the effectiveness of this material.

The purpose of this study is to develop a game aimed at enhancing students' awareness of sustainable development and to examine the effectiveness of the developed game. As part of the study, a gamified educational application was developed, and the effects of the game on students' sustainable consciousness were examined. Therefore, the research question is: *"Does the game-based application have an effect on students' sustainable consciousness?"* The sub-questions are:

1. Is there a significant difference between students' pre-test and post-test scores on sustainable consciousness*?*

2. What are students' perceptions of the developed application?

Method

Research Design

This study, which investigates the effects of a game application developed on the topic of the Sustainable Development Goals (SDGs) on students' sustainable consciousness and perspectives, was designed according to a "mixed-methods" approach. The mixed-methods approach is a methodology that combines qualitative and quantitative methods, in which both qualitative and quantitative data are collected and analyzed together (Creswell and Plano-Clark, 2007). In the quantitative dimension of this project conducted with high school students, a "single-group pre-test post-test quasi-experimental design" was used, while in the qualitative dimension, the phenomenological design—one of the qualitative research methods—was employed. The phenomenological design, a qualitative research method, is a research approach used to uncover individuals' experiences, perceptions, and ways of interpreting a phenomenon (Creswell, 2007). In this project as well, students' experiences with the game application were examined in depth.

Participants

This study was conducted with 53 students enrolled in two separate classes at a science high school located in eastern Türkiye. The project was implemented during the first semester of the 2025–2026 academic year. The study was implemented during the first semester of the 2025–2026 academic year. The "convenience sampling" method was used to select the participants for the study. In this method, the researcher selects a situation that is close to them and easily accessible, thereby adding speed and practicality to the research (Yıldırım and Şimşek, 2016). The participants were selected from the school where the project coordinators were also enrolled. Of the participants, 23 were female and 30 were male, with ages ranging from 14 to 15.

Game Development

The game design process began with a detailed examination of the 17 Sustainable Development Goals established by the United Nations. The sub-themes of each goal were identified, ensuring that the game content is pedagogically comprehensive and holistic.

1. Phase: Development of the Game Board: First, the game board was developed. For this purpose, the "Canva" program, a digital Web 2.0 design tool, was used. While designing the game board, care was taken to ensure it was easy for students to understand, visually engaging, and structured to support the flow of the game. The game board is shown in Figure 2:

Fig. 2: Green Move 2030 (Yeşil Hamle 2030) Game Board

The game board is designed as a path leading from the "start" point to the "finish" point, and is intended to have students encounter various types of cards along the way that engage their cognitive (banned words and quiz cards) and psychomotor (action cards and drawing cards) skills. Each square on the board represents a specific task category: BW = Banned Word (YK: Yasaklı Kelime), QC = Quiz Card (BK: Bilgi Kartı), AC = Action Card (HK: Hareketli Kart), and DA = Drawing Card (ÇA: Çizerek Anlat). The game board also features directional squares that alter the students' progress, such as "1 step forward," "2 steps forward," and "double time." These squares add dynamism to the game while also supporting strategic thinking and team interaction. Furthermore, the game board's overall design incorporates visuals themed around the world, nature, and sustainability, aiming to create an educational aesthetic that captures students' interest through colorful boxes and thematic categories. The game's name, "Green Move 2030," is displayed at the top of the board, and there is a small box on the right side containing descriptions of the card types. This allows students to easily grasp the game's rules and the functions of the cards.

2. Phase: Creating the Game Cards: After the game board was created, the card sets—which form the core component of the game—were

developed. The card sets were designed using the Canva program. The cards were developed under four different categories to support the teaching of the Sustainable Development Goals (SDGs): Banned Word (BW): On these cards, students were asked to explain a specific SDG concept, but were prohibited from using certain basic words associated with that concept. Action Card (AC): With these cards, students are asked to act out the given SDG theme using gestures, facial expressions, role-playing, or body movements. Quiz Card (QC): These cards contain information related to the SDGs. Students are asked to either evaluate a statement as true or false or select the appropriate option from the given choices (multiple-choice). Drawing Card (DC): On these cards, students are asked to illustrate the given SDG concept through drawing. Designed to emphasize visual thinking, these cards aim to concretize abstract concepts and foster students' creativity.

A total of 150 cards were created across four categories (BW: 89, AC: 21, QC: 18, DC: 22). The cards, created using the Canva program, were first exported to a Word document, and then high-resolution prints were produced using a printer.

Game Materials: The game consists of a game board, game cards, movement tokens, and a timer.

How to Play

The game is typically played between two groups, though the number of groups can be increased depending on class size. Each group consists of 2–6 students, and groups take turns moving a pawn. In this dice-based game, players must complete the task associated with the card type corresponding to the space the pawn lands on within the allotted time. A 1-minute time limit is given for "Banned Word" (BW) cards, and 30 seconds for other card types; time is measured using a stopwatch. If the task is successfully completed, the game continues; if not, no progress is made. The group that reaches the finish line on the game board first wins the game. In the event of a tie, the winner is determined based on task completion and accuracy criteria.

Implementation of the Study

The study consisted of two phases. In the first phase, a game titled Green Move 2030 was designed; in the second phase, the game was played with students at a science high school. The implementation process took place over five weeks. The necessary legal permits for the study were obtained, and the permit documents were submitted to the school administration. The school administration provided teachers with the necessary information to conduct

the implementation in the classrooms. The Sustainable Awareness Scale was administered as a pre-test. The implementation was carried out with students continuing their studies in two separate classes at the science high school. In the second week, the game was introduced to the students in the classroom. Three separate groups were formed in the classroom. Each group was given a game set. The two researchers who developed the project also moved among the groups under the supervision of the classroom teacher to manage the process. Some images related to the game-playing process are provided below:

Fig. 3. Implementation process.

The game was played over a three-week period. During the final week, the same scale was administered as a final test. Additionally, interviews were conducted with twenty students from two separate classes.

Data Collection Tools

1. Sustainability Consciousness Scale

The Sustainability Consciousness Scale is a measure originally developed by Michalos et al. (2012), updated by Gericke et al. (2018) under the title "Sustainability Consciousness Questionnaire," and adapted into Turkish by Yüksel and Yıldız (2019). The scale consists of 50 items organized into the sub-dimensions of knowledge, attitude, and behavior. The researchers conducted the study with a total of 1,085 student volunteers from 5 schools (1 health vocational school, 1 industrial vocational school, 1 science high school, and 2 Anatolian high schools) located in a medium-sized province in the Western Black Sea region. The researchers performed Exploratory Factor Analysis and Confirmatory Factor Analysis while adhering to the scale's original structure. At the conclusion of the study, the researchers demonstrated that the scale's AFA and DFA results were consistent with the original, Swedish, and Taiwanese versions of the scale. The researchers calculated the Cronbach's alpha coefficient for the scale as 0.860. The test was administered as a pre-test prior to the process and as a post-test at the conclusion of the process.

2. Interview Form

An interview form was used to identify students' feelings and thoughts regarding the process. Initially, 12 questions were prepared for inclusion in the interview form, and these questions were submitted for expert review. Based on the feedback received from the experts, some questions were removed from the form, while others were revised and re-included. The questions were reviewed by a Turkish language teacher for clarity and grammatical accuracy. After incorporating all feedback, the 7-question interview form was finalized.

3. Field Notes

The researchers observed the activities throughout the implementation and took field notes regarding significant events that occurred during the process. The field notes, intended to support the data, were used to ensure data diversity.

Data Analysis

Quantitative data analysis methods were used in the analysis of the Sustainable Consciousness Scale. The SPSS 22 software package was utilized

for data analysis. The collected scale data were first saved to an Excel file following the appropriate steps and then imported into the SPSS program. To determine which tests to use in analyzing the scores students received on the pre-test and post-test, the data was first examined to see if it followed a normal distribution. For this purpose, the skewness and kurtosis coefficients of the test scores were examined. The results of the analyses are presented in Table 1:

Table 1. Skewness and kurtosis results for students' pre-test and post-test scores on the Sustainable Consciousness Scale

	Tests	N	Mean	Variance	S.D.	Min.	Max.	Skewness	Kurtosis
Sustainability Consciousness Scale	**Pre test**	53	176.58	343.517	18.534	133	220	.112	-.050
	Post test	53	206.32	368.837	19.205	160	236	-.611	-.103

Upon examining Table 1, it was found that the skewness coefficients for the pre-test and post-test scores of the Sustainable Consciousness Scale were .112 for the pre-test and -.611 for the post-test, while the kurtosis coefficients were -.050 for the pre-test and -.103 for the post-test. To assess whether the results follow a normal distribution, it is considered sufficient for the skewness and kurtosis coefficients to fall within the range of -1.5 to +1.5 (Tabachnick and Fidell, 2013). The analyses revealed that the data follow a normal distribution. In light of these results, it was decided to use the paired (related) groups t-test from parametric tests to test whether there was a significant difference between the scores students received on the pre-test and post-test.

In the analysis of the data collected via the interview form, descriptive and content analysis were conducted in accordance with the nature of qualitative research. First, the students' comments were transcribed into a Word document, and several readings were conducted based on this data. As a result of the analyses, codes were created, and similar codes were grouped together to form themes. Ethical guidelines were strictly followed in the project; for this purpose, students were assigned codes such as S1, S2, etc., instead of their real names, and it was emphasized that participation in the study was voluntary.

Results

This section presents the results from the analysis of data collected using quantitative and qualitative data collection tools.

1. Results Regarding the Sustainable Consciousness Scale

To determine whether there was a significant difference between the scores students obtained on the "Sustainable Consciousness Scale" pre-test and post-test, a paired t-test was used. The results of the t-test are presented in Table 2:

Table 2. Results of the paired t-test for the pre-test and post-test scores of the study group on the Sustainable Consciousness Scale

	Tests	N	X	S.D.	Sd	t	p
Sustainable Consciousness Scale	**Pre test**	53	176.58	18.534	52	-7.319	.000
	Post test	53	206.32	19.205			

Upon examining Table 2, it was observed that the mean pretest score for the study group was 176.58, while the mean posttest score was 206.32. To determine whether there was a significant difference between the study group's pretest and posttest scores, a paired t-test was conducted at the .05 significance level. The results of the analysis revealed a statistically significant difference in favor of the post-test scores between the study group's pre-test and post-test scores ($p < .05$). Based on these findings, it was concluded that the "Green Move 2030" game administered to the study group had a positive effect on increasing students' sustainability consciousness.

2. Results Regarding the Interview Form

In the fifth (and final) week of the program, interviews were conducted with the 20 volunteers in the working group. The primary objective here was to determine the students' perceptions of the program. To this end, the students' comments were first transcribed into a digital format, and analyses were conducted based on this data. As a result of the analyses, codes were generated. Codes that were related to one another were grouped under specific themes. Based on the analyses, five distinct themes were identified from the students' views: "Emotions," "Cognitive Learning," "SKH Awareness," "Social Interaction," and "Dissemination." The word cloud of the codes under the "Emotions" theme is presented in Figure 4:

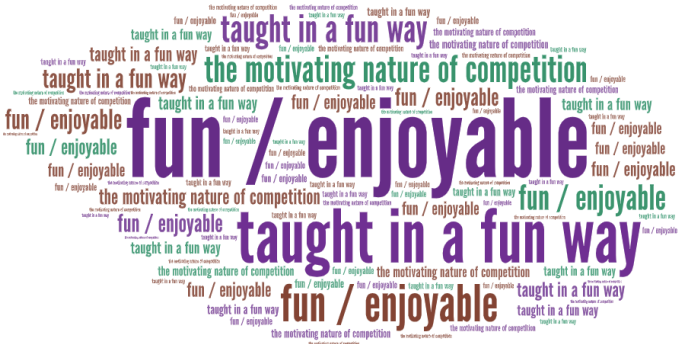

Fig. 4. Word cloud of codes under the "Emotions" theme.

Some student comments that generated these codes are provided below:

S2: "This game we played entertained us and taught us things in a fun way. That's why I found it very useful. It could be improved even further."

S10: "It made the game more fun and learning more enjoyable. Also, feeling the competition while competing and wanting to win increased my focus."

S11: "Fun, educational, and pleasant."

S14: "The game was really nice and fun. It created a friendly competition… Hands-on learning makes it more fun and helps retain information better."

S16: "It was great. It was a very fun and educational game. There was a lot of competition."

S18: "The information sticks better in my mind, and I'm learning while having fun."

S19: "It was very fun and educational. It helped me gain knowledge about this topic."

The researchers "*When I asked my friends for their opinions, they said they now fully understood the game and were having more fun because of it. Even though some friends behaved differently, it was clear that everyone was having fun while playing the game. I observed that the game was just as popular in the other class*" and "*When we played it a second time, it was easier to get organized because everyone was more familiar with it, and I think they had even more fun,"* such field notes support these findings.

The word cloud of the codes included in the "Cognitive Learning" theme is shown in Figure 5:

analytical / intellectual development
to take a broad view of sustainability
learning new concepts/terms
long-term learning / retention

Fig. 5. A word cloud of the tags under the "Cognitive Learning" theme.

Some of the students' comments that led to the creation of these codes are provided below:

S2: "I learned that using renewable energy resources efficiently is very important for sustainability."

S3: "I learned that sustainability can be achieved beyond just issues like water and energy conservation."

S5: "I learned a lot, especially that sustainability has a very broad meaning and is connected to many things."

S6: "I gained a lot of knowledge about sustainability. I've paid more attention to applying these in my daily life."

S12: "I had no idea how to solve poverty, but I think if we come together, it's not something we can't overcome."

The researchers' field notes, which included statements such as *"The participating children agreed that the game was educational"* and *"I noticed that everyone was learning while having fun,"* support these findings.

The word cloud of the codes included in the "SKH Awareness" theme is shown in Figure 6:

call for action / call for awareness
recognizing importance / seriousness
personal responsibility / being more mindful
recognizing importance / seriousness
personal responsibility / being more mindful
call for action / call for awareness
recognizing importance / seriousness
personal responsibility / being more mindful
call for action / call for awareness
personal responsibility / being more mindful
recognizing importance / seriousness
call for action / call for awareness
personal responsibility / being more mindful
recognizing importance / seriousness

Fig. 6. A word cloud of the keywords featured in the "SKH Awareness" theme.

Some of the students' comments that led to the creation of these codes are provided below:

S6: "I realized that these are very important concepts. I've thoroughly learned the concepts that play a significant role in our lives."

S10: "We need to use resources more carefully. It's unfair to waste resources while poverty is rising like this. I also realized that there isn't enough work being done in society to promote equality and development."

S15: "Actually, if you ask anyone, they'll feel sad about these situations and want them to improve. But nobody does anything. Using these elements in the game made me realize that we need to raise awareness because we aren't doing anything about them."

S16: "I thought sustainability positively impacts our lives in many ways."

S17: "I realized just how important and serious these issues are, and that they deserve our attention."

The word cloud of the codes included in the "Social Interaction" theme is shown in Figure 7

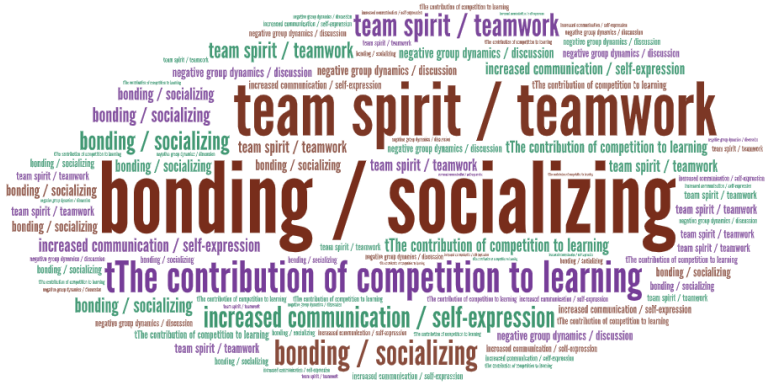
team spirit / teamwork
bonding / socializing
The contribution of competition to learning
increased communication / self-expression
negative group dynamics / discussion

Fig. 7. A word cloud of the codes included in the "Social Interaction" theme.

Some of the students' comments that led to the creation of these codes are provided below:

S2: "It helped me bond with my classmates; we had a lot of fun and learned new things while doing so. We laughed, asked questions, and maybe argued a little. It was a wonderful moment for me."

S3: "It instilled a sense of team spirit and awareness. It helped us bond with our friends."

S6: "Working as a group strengthened my friendships. I'd like to thank my friends for this activity."

S14: "Competing with the other group while communicating within our own group made knowledge sharing more fun and memorable."

S16: "Even though it led to some minor disagreements, it helped us bond as a class."

S19: "Thanks to our communication within the group and our competition with the other group, I learned more easily, enjoyably, and memorably."

The field notes taken by the researchers, which state, *"I noticed that this game fostered a sense of camaraderie in the classroom,"* support these findings.

The word cloud for the codes included in the "Dissemination" theme is shown in Figure 8:

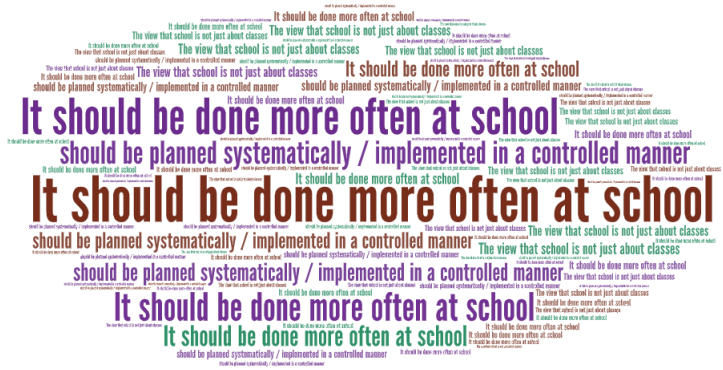
It should be done more often at school
should be planned systematically / implemented in a controlled manner
The view that school is not just about classes

Fig. 8. A word cloud of the codes included in the "Dissemination" theme.

Some of the students' comments that led to the creation of these codes are provided below:

S2: "So, I think it should be done, but it needs to be organized in a certain way to be more effective. The reason is this: these kinds of activities teach while entertaining and entertain while teaching. That's why I believe they should be held more often."

S3: "Maybe. I think that if our sole focus is on lessons, we might get bored, and different activities could help boost our motivation."

S7: "That would be great. After all, school isn't just a place for lessons; students should be educated about the world and develop their social skills."

When students' opinions are evaluated overall, the "Green Move 2030" game has been shown to have positive effects on high school students in areas such as (1) positive emotional experiences and motivation, (2) cognitive gains related to sustainability, (3) awareness of and a sense of responsibility toward the SDGs, (4) in-class social interaction and teamwork, and (5) scalability within the school environment. Based on student feedback, it has been concluded that "Green Move 2030," a game-based approach, could be an effective method in sustainability education that both supports learning and increases student engagement.

Discussion, Conclusions, and Recommendations

The study examined the impact of the game-based application on students' levels of sustainable consciousness and perceptions by analyzing both

quantitative and qualitative data. For the quantitative findings, the Sustainable Consciousness Scale was administered as a pre-test before the intervention and as a post-test after the intervention. When comparing students' pre-test and post-test scores on the Sustainable Consciousness Scale, a statistically significant difference in favor of the post-test was found. The fact that the average score of students in the study group increased from 176.58 on the pre-test to 206.32 on the post-test indicates that the game was effective in enhancing students' levels of sustainable awareness. In their study, Yakışık and Mustafazade (2023) used the same scale and found that participants' awareness of sustainable development varied according to gender, age, occupation, income level, and whether they had previously heard of the concept of sustainable development; however, it did not vary according to educational status, the place where the individual grew up, marital status, or the current status of the school the individual is attending. Using the same scale, Akkuş (2024) conducted a study to determine the levels of sustainability awareness among students in the Faculty of Health Sciences, noted that age has no significant effect on sustainability awareness, that gender has a significant effect on sustainability attitudes, that there are significant differences in sustainability awareness and behaviors among students based on their departments, and that there is a significant relationship between income level and sustainability awareness. In his study conducted with employees of logistics firms, Yılmaz (2023) used the same scale and demonstrated that there were significant differences among white-collar employees at these firms in terms of age, gender, educational background, and tenure. In his study, Demir (2022) sought to statistically evaluate the level of sustainability awareness among banking sector employees in terms of sociodemographic variables and to determine their attitudes; at the conclusion of the study, female employees, those aged 25–35, individuals with graduate-level education, "married" participants for the knowledge and attitude sub-dimensions, "single" participants for the behavior sub-dimension, and participants with an income of "40,001 TL and above" for the knowledge and behavior sub-dimensions had significantly higher sustainable awareness scores. It was observed that the vast majority of these studies were descriptive in nature and focused on specific demographic variables. In this study, however, the change in high school students' levels of sustainability awareness resulting from a game-based educational intervention was examined using an experimental approach. In fact, the data analyzed by Biçer (2024) in his study align with the findings of our research. In his master's thesis involving high school students, Biçer (2024) implemented a STEAM education program with the experimental group, administered the Sustainable Awareness Scale along with several other scales during the

intervention, and concluded that the STEAM approach positively influenced students' understanding of sustainable development. In their study, Uleanya et al. (2024) noted that incorporating sustainability-related content into the curriculum has the potential to enhance students' sustainability awareness. The findings of these studies in the literature are consistent with the findings obtained in our study.

The findings derived from qualitative data show us that the game not only enhances students' sustainable consciousness but also positively influences their perceptions of the Sustainable Development Goals. Regarding the "Emotions" theme, students generally reported that they found the game fun, motivating, and exciting, and that it taught them information in an entertaining way. It was demonstrated that students showed willing and active participation in the learning process thanks to the Green Move 2030 game. The "Cognitive Learning" theme indicates that the game we developed is effective in imparting new knowledge to students. Based on the views expressed under the SDG awareness theme, it was determined that the game prompted students to begin evaluating the Sustainable Development Goals from a broader perspective and to develop new perspectives on these goals. Within this theme, particular emphasis was placed on "poverty," "social equality," and "sense of responsibility." In the social interaction theme, attention was drawn to the social dimension of the game. Students stated that the game positively supported in-class communication and interaction. Given the high scores students gave the game, it was observed that their level of satisfaction with the game was high. Additionally, it was observed that students viewed the increased use of such activities in the teaching-learning process positively within the dissemination theme. The results of our study align with the literature highlighting the positive aspects of game-based learning (Kel and Kul, 2021; Serdaroğlu and Güneş, 2019; Şentürk, 2020; Tuğluca, 2023).

This study concluded that the "Green Move 2030" game developed in this research is an effective learning tool for increasing high school students' levels of sustainable consciousness. However, the fact that the developed application was limited to 9th-grade students at a single science high school restricts the generalizability of the findings. In this regard, it is recommended that future studies examine the game's effectiveness by comparing its application across different types of high schools, different grade levels, and educational institutions outside of high school (elementary school, middle school, university). Furthermore, using the game not only within the context of geography but also by integrating it with other subjects such as science, biology, social studies, and citizenship education could contribute to addressing sustainable development goals through an interdisciplinary approach.

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CHAPTER 7

The Effect Of Work Autonomy On Leader Teacher Behavıour

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Merve KISAOĞLU[3]

Abstract

The aim of this study is to examine the effect of teachers' perceptions of work autonomy on their leadership behaviours. The study sought to determine whether work autonomy influences teachers' levels of demonstrating leadership behaviours and perceiving such behaviours as necessary; if so, the extent and direction of this effect were also investigated. The study was conducted using a correlational survey model. The sample consisted of 304 teachers working in the Şehitkamil district of Gaziantep province, selected using simple random sampling. Research data were collected using the Work Autonomy Scale' and the 'Teacher Leadership Scale'. Descriptive statistics, correlation analysis and regression analysis were used in the analysis of the data. According to the research findings, it was determined that teachers' perceptions of work

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autonomy were above average. It was also found that teachers' levels of demonstrating leadership teacher behaviours and perceiving these behaviours as necessary were high. Furthermore, positive and significant relationships were found between the perception of work autonomy and the levels of demonstrating and perceiving the necessity of leader teacher behaviours. The results of the regression analysis revealed that work autonomy is a significant predictor of both demonstrating leader teacher behaviours and perceiving the necessity of these behaviours..

Keywords: Work autonomy, Leader teacher, Education

Introduction

For organisations to successfully own their goals, it is essential to have individuals who enjoy their profession, feel a sense of belonging, and feel empowered to make independent decisions within their area of expertise. Organisations managed through a rigid hierarchy, inflexible rules and a lack of decision-making power granted to individuals find it extremely difficult to develop and adapt to the changing times. İn this context a review of the literature reveals that work autonomy and the behaviour of leader teachers are important, provided they do not conflict with organisational objectives.

The concept of work autonomy is defined by terms such as decision making freedom at work, independence, the ability to create one's own work plan, deciding on the work to be done, working without excessive supervision, and the managed delegating authority and responsibility to employees (Kuratko, Hornsby & Goldsby) Furthermore, according to Hackman and Oldham (1975), work autonomy is a structure encompassing the concepts of freedom and liberty in the work process (Soylu 2024, p. 31). While Morgeson et al. (2005) define work autonomy as the degree to which an individual possesses the freedom to plan, implement and evaluate the processes involved in achieving defined goals in their work; Sripirabaa and Maheswari (2015) define it as granting individuals freedom, independence and discretion regarding the determination of methods to be used in the planning and execution of work (Akkaş, 2025, pp. 30–31). It is also described as the ability to independently compare, make decisions and take action to achieve results based on an individual's skills and experience (Doğan and Can, 2009).

Research shows that work autonomy has a positive impact on employees' experience-based responsibility, work satisfaction, motivation (Hackman and Oldham, 1976) and levels of commitment (Soylu 2024, p. 30). Work autonomy creates a suitable environment for innovative initiatives by enabling individuals to utilise organisational resources (Pekdemir, Koçoğlu & Gürkan,

2014). Individuals are able to perform their works more professionally through work autonomy (Doğan and Can, 2009). According to Ali et al. (2014), the concept of work autonomy makes a significant contribution to work satisfaction. Furthermore, individuals take greater ownership of organisational problems through work autonomy (Tan, 2023). Work autonomy offers employees the flexibility to contribute to their work, create added value, and manage work processes at their own pace (Dee et al., 2000, cited in Akkaş, 2025, p. 30). Naqvi, Ishtiaq, Kanwal & Ali (2013) state that employees who feel autonomous in their work will see an increase in their work performance and will have confidence in carrying out their tasks; consequently, work activities will increase alongside motivation (Özdemir & Şahin, 2019). Through work autonomy, individuals are able to utilise their knowledge, skills and creative behaviours without external interference and develop their own unique strategies (Akkaş, 2025). On the other hand, Benson (2001) notes that employees who feel autonomous in the workplace are individuals who are self-aware regarding their own learning, highly motivated, methodical, disciplined, self-confident and capable of self-assessment. Similarly, Hackman & Oldham (1976) states that employees who feel autonomous in their work will achieve high levels of performance because they possess the discretion to determine work procedures and are free and independent. On the other hand, Dude (2012) emphasize that individuals with a high perception of work autonomy also have higher levels of organisational commitment and organisational trust, and noted that those who feel autonomous exhibit positive organisational behaviours more frequently.

According to Kutanis (2018), the elements of work autonomy are primarily examined under five categories. These elements are:

1. Knowledge: The competencies employees must possess to act autonomously within work processes based on their areas of expertise,

2. Independence: The ability of individuals to make their own decisions based on their knowledge and experience in their areas of expertise, to implement these decisions, and to take responsibility;

3. Comparative Analysis: The ability of employees to distinguish between options in work processes in line with their individual competencies and to recognise the differences between alternatives,

4. Decision-Making Ability: The ability to make independent decisions aligned with organisational objectives, based on one's own skills and experience,

5. Consistency: This encompasses the consistency and stability demonstrated in an individual's behaviour throughout the process, in line with their thoughts. (Akkaş, 2025, pp. 33–35).

Considering these elements, it can be argued that work autonomy provides a scope of action, granting individuals the freedom to carry out a task using criteria, schedules and methods they themselves determine. Of course, it is argued that individual preferences must be compatible with the structure of the organisation (its objectives, mission, culture and other characteristics).

When work autonomy is considered within an educational context, teachers are one of the most important factors contributing to success and efficiency in educational organisations. One of the most important factors determining the quality of education is teachers' ability to make independent decisions regarding how teaching and learning will take place within the classroom. It is believed that teachers who feel autonomous in their work take risks regarding teaching processes and exhibit innovative behaviours, thereby primarily benefiting themselves, their students and the school. Sentovich (2004) states that teachers having autonomy at the school level to contribute to achieving school objectives will increase their work satisfaction (Özdemir & Şahin, 2019). In work environments, leaders and organisations supporting employees' freedom to carry out their own work is directly linked to individuals' freedom and well-being. As this support increases, employees' self-management skills develop and their work improves (Özkal & Demirkol, 2014, cited in Soylu 2024, p. 32). Consequently, it is anticipated that school leaders' support for teachers' work autonomy will yield similar outcomes within the school environment. In this context, work autonomy—a relatively new concept for educational institutions—can be regarded as a significant indicator of the extent to which educational staff possess characteristics such as freedom, decision-making ability, motivation, self-confidence and responsibility. Work autonomy is also a significant concept in terms of reducing work-life conflicts, enhancing creative thinking skills alongside freedom, and enabling the individual to feel like a reliable person (Özdemir & Şahin, 2019, p. 1178).

Nowadays, the presence of leader teachers in educational institutions has become increasingly important. The teacher's traditional role as a mere transmitter of knowledge has now changed. In an age where learners face almost no difficulty in accessing information, the traditional roles of teachers are no longer sufficient. In this sense, it is considered a necessity of the 21st century for teachers to provide leadership to learners within the education and teaching process. Bursalıoğlu describes the characteristics of a leader teacher as individuals who are compatible with their environment in terms of knowledge and personality, capable of establishing public relations, and able to contribute to community development (1994, cited in Yiğit, Doğan & Uğurlu, 2013). Lambert (2003), on the other hand, defines teacher leaders as individuals who harbour a vision of making a difference, succeed in keeping

their purpose-driven emotions alive, are reflective and inquisitive, activity-focused, develop their craft, possess a strong sense of self, take responsibility for student learning, and remain open to learning themselves (Yılmaz & Jafarova, 2022). Leblanc and Shelton (1997) define teacher leadership as the process of helping others, particularly students; transforming individual behaviours into group behaviours; and motivating others to give purpose and direction to their lives (Yücel, 2020, p.23). Furthermore, Basım et al. (2009) have stated that teacher leadership encompasses the concepts of continuous learning, research, and supportive leadership (Yiğit, Doğan & Uğurlu, 2013). Leading teachers set new goals for the schools where they work, contribute to the school's academic success, and support their colleagues (Leithwood, 2003). According to Can (2010), they voluntarily take on roles in educational activities and processes within the school and support their colleagues and peers in their professional development.

Four dimensions stand out that distinguish teacher leader behavior from other types of leadership. These dimensions are explained as follows:

Brokering role relates to the translation of school development principles into individual classroom practices. In this role, the teacher acts as a broker; rather than presenting knowledge directly to learners, they assume the role of a bridge to help learners access the right information and establish connections between learners and the external world and resources

Participative leadership is the second dimension of teacher leadership. This dimension emphasises the need for all teachers to feel a sense of ownership. Lead teachers provide guidance by working alongside other teachers to encourage school development.

Mediating role focuses on the mediating role of teacher leadership. This dimension involves teachers, as leaders, guiding learners in cognitive, socio-emotional, technological and pedagogical areas

Forging close relationships concerns the establishment of close relationships. This dimension encompasses relationships between colleagues. It involves the creation of close relationships where mutual learning also takes place among teachers (Harris, 2005; Muijs and Harris, 2003, cited in Yücel, 2020).

İn this context Harris and Muijs (2006) listed the effects of teacher leaders on school development as:

1. Supporting other teachers in developing successful teaching practices.

2. Undertaking work aimed at curriculum development.

3. Ensuring participation in decisions regarding teaching.

4. Supporting the adoption of sound and effective decisions.

5. Planning and evaluating in-service training.

6. To foster a culture within the school where teachers can ask questions (İlhan et al., 2024, pp. 25–26)

In line with these explanations and the literature; in studies on work autonomy: the concepts of "ability to plan work, decision-making, taking greater ownership of problems, creating added value, increased work activity, risk-taking, work satisfaction, authority to recognise merit, taking initiative, innovation, competence, self-confidence, motivation, organisational commitment and organisational trust" are seen to come to the fore. When studies on teacher leadership are examined: "participation in planning (Beycioğlu & Aslan, 2010), encouraging ownership of problems (Bolat, 2023), decision-making (Bolat, 2023; Demir, 2014), Contributing to school development, motivation, risk-taking (Çetinkaya & Arastaman, 2024), innovative thinking (Akyürek & Özdemir, 2021), goal-setting, entrepreneurship (Gülbahar, 2017) and a sense of trust within the school (Demir, 2014)" are highlighted. It is evident that research on work autonomy and leader teachers shares compatible common concepts. Within this framework, it can be stated that there is a relationship between teachers possessing work autonomy in the school environment and their demonstration of leader teachers behaviours. It is considered that the nature of this relationship lies in work autonomy acting as a predictive and facilitating factor in the emergence of leader teachers behaviours.

This study aims to reveal the effect of teachers' perceptions of work autonomy on the leader teachers behaviours they exhibit during their professional practice. In this regard, the existence, direction and magnitude of the effect of work autonomy on leader teachers behaviours constitute the central research problem. Consequently, a conceptual framework regarding the relationship between teachers' work autonomy and their leadership behaviours has been presented. The aim of this study is to determine whether work autonomy influences leader teachers behaviours; and if so, to what extent and in what manner this influence operates. The sub-objectives of the research are to find out:

1. The level of teachers' work autonomy, their perceived degree of demonstrating leader teacher behaviours, and their perceived degree of regarding leader teacher behaviours as necessary

2. Relationship between teachers' perceptions of work autonomy and their perceptions of demonstrating and perceiving the necessity of leader teacher behaviour?

3. Teachers' perceptions of work autonomy a significant predictor of their perceptions of demonstrating leader teacher behaviours?

4. Teachers' perceptions of work autonomy a significant predictor of their perceptions of the necessity of leader teacher behaviour?

Method

The Method section provides information on the research model, population and sample, data collection tools and techniques, and the work carried out during the data collection, analysis and interpretation stages.

Research Method

In this study, the effect of teachers' perceptions of work autonomy on leader teachers behaviours was examined, and the research was conducted based on a correlational survey model. The correlational survey approach is a research design that enables the identification of interactions between multiple variables and the identification of potential predictive relationships between variables (Can, 2017).

Population and Sample

The sample group for the study consists of teachers working in primary schools in the Şehitkamil district of Gaziantep. A total of 304 teachers, selected using simple random sampling, were included in the study. It is considered that the 304 participants reached within the scope of the study represent the population at an acceptable level. Data from the participant group was collected through face-to-face interviews conducted during school visits. Of those participating in the study, 71.7% were women and 28.3% were men. In terms of educational level, 80.3% of the participants hold a bachelor's degree, whilst 19.7% hold a postgraduate degree. In terms of professional seniority, 26.6% have 1–5 years' experience, 30.9% have 6–10 years' experience, 20.4% have 11–15 years' experience, and 22% have 16 years or more of professional seniority.

Data Collection Tools

The data for the study were collected using the 'Work Autonomy Scale' and the 'Teacher Leadership Scale'. Work Autonomy Scale: In this study, the Work Autonomy Scale—a single-dimension, 9-item scale developed by James A. Breaugh (1989) and adapted into Turkish by Özdemir and Şahin (2019)—was used. The Cronbach's Alpha reliability coefficient of the original scale is

.97. The Cronbach's Alpha value of the adapted scale was found to be .84. A 5-point Likert-type scale (1: Never, 5: Always) was used to rate the scale items.

Teacher Leadership Scale: The "Teacher Leadership Scale", developed by Beycioğlu and Aslan (2010), consists of 25 items across 3 dimensions. The 'Collaboration with Colleagues' dimension contains 5 items (1–5), the 'Professional Development' dimension contains 11 items (6–16), and the 'Organisational Development' sub-dimension contains 9 items (17–25). The Cronbach's Alpha coefficient for the original scale was calculated as 0.95. When examining the reliability coefficients for the dimensions, these were calculated as 0.87 for Organisational Development, 0.87 for Professional Development, and 0.92 for Collaboration with Colleagues.

Data Analysis

The research data were analysed using the JAMOVI statistical software package. During the analysis process, the assumption of normal distribution for the variables was first examined. In this context, measures of central tendency were assessed alongside skewness and kurtosis coefficients. The skewness value for the work autonomy scale was determined to be -0.00, whilst the kurtosis value was -0.67. It was found that the skewness values for the teacher leadership variable ranged from -0.21 to -0.48, whilst the kurtosis values ranged from -1.50 for the total score to -1.31 and -1.46 for the sub-dimensions. The fact that these values fall within the ±1.5 range proposed by Tabachnick and Fidell (2019) indicates that the data meet the assumption of normal distribution. Furthermore, the results of the Shapiro–Wilk test support this finding ($p = .06 > .05$), showing that the distribution is normal. Prior to proceeding with the regression analysis, the assumption of multicollinearity was examined; it was determined that the variance inflation factor (VIF) values were below 10 (VIF = 1.34), the tolerance values were above .10 (TV = .35) and the condition indices were below 30 (CI = 18.6). These findings indicate that there is no issue of multicollinearity among the variables (Çokluk et al., 2016). Consequently, it was concluded that the basic assumptions for regression analysis were met. Descriptive statistics (arithmetic mean, standard deviation and percentage) were used to determine the participants' demographic characteristics. Correlation analysis was used to reveal the relationships between variables; regression analysis was conducted to determine the extent to which perceived work autonomy predicts leader teachers behaviour.

Ethical Approval

In this study, all procedures were conducted in accordance with the principles of the Guidelines on Scientific Research and Publication Ethics of Higher Education Institutions. None of the actions described in the section "Actions Contrary to Scientific Research and Publication Ethics" were carried out. Ethical approval was obtained from the Gaziantep University Social and Human Sciences Ethics Board at the beginning of the research.

Results

Findings Regarding Sub-Problem 1: What are the levels of teachers' perceptions of work autonomy, the extent to which they exhibit leader teacher behaviours, and the extent to which they perceive leader teacher behaviours as necessary?

The findings regarding the first sub-problem of the study, "What is the level of teachers' perceptions of work autonomy, the degree to which they exhibit leader teachers behaviours, and the degree to which they perceive leader teachers behaviours as necessary?", are presented in Table 1.

Table 1. *Teachers' perceptions of the variables*

Variables	$\underline{X}$	N
1. Work autonomy	3.42	.08
2. Demonstrating teacher leadership (Dimension 1: Collaboration with colleagues)	3.59	1.36
3. Demonstrating teacher leadership (Dimension 2: Professional development)	3.33	1.31
4. Demonstrating teacher leadership (Dimension 3: Organisational development)	4.06	.75
5. Demonstrating teacher leadership overall	3.65	1.09
6. Perceiving the need for teacher leadership (Dimension 1: Collaboration with colleagues)	3.19	1.38
7. Perceiving the need for teacher leadership (Dimension 2: Professional development)	3.13	1.36
8. Perceiving the need for teacher leadership (Dimension 3: Organisational development)	3.50	1.42
9. Perception of the need for teacher leadership in general	3.28	1.37

Upon examining Table 1, it can be seen that teachers' perceptions of work autonomy are above the mid-range ($\bar{X} = 3.42$). It can be said that, in general, teachers believe they have work autonomy in their schools.

When the findings regarding the levels of teacher leadership are evaluated, it is evident that the highest mean score was in the institutional development dimension ($\bar{X}$ = 4.06), followed by collaboration with colleagues ($\bar{X}$ = 3.59) and professional development ($\bar{X}$ = 3.33). The overall level of teacher leadership was relatively high ($\bar{X}$ = 3.65), suggesting that teachers believe they demonstrate leadership behaviours in their schools.

When examining the levels at which teachers perceive leader teachers behaviours as necessary, it is notable that the means across all dimensions cluster around the mid-range. In this context, the highest mean was found in the organisational development dimension ($\bar{X}$ = 3.50), whilst the lowest mean was in the professional development dimension ($\bar{X}$ = 3.13). Overall, it can be stated that the level of perceived necessity for teacher leadership ($\bar{X}$ = 3.28) is at a moderate level.

When the findings are evaluated together, it is observed that the level at which teachers demonstrate leadership behaviours is higher than the level at which they perceive these behaviours as necessary. This suggests that teachers' tendency to apply leadership behaviours may be at a more advanced stage than their perceived level of necessity regarding these behaviours. Furthermore, this situation may also stem from the fact that, although teachers actually demonstrate leadership behaviours in line with professional responsibility, experience and school-based practical requirements, their awareness of the conceptual necessity of these behaviours has not developed to the same extent.

Findings Regarding Sub-Problem 2: Is there a significant relationship between teachers' perceptions of work autonomy and their perceptions of demonstrating and perceiving the necessity of leader teachers behaviours?

The findings regarding the second sub-problem of the study, "Is there a significant relationship between teachers' perceptions of work autonomy and their perceptions of demonstrating and perceiving the necessity of leader teachers behaviour?", are presented in Table 2.

***Table 2**. Bivariate correlation matrix of teachers' perceptions of* work *autonomy and teacher leadership*

Value	1	2	3
1-Work autonomy	1	.44**	.43**
2-Demonstrating teacher leadership		1	.97**
3-Perceiving the need for teacher leadership			1

**p<.01

Upon examining Table 2, it can be seen that there is a moderate and positive relationship between work autonomy and the demonstration of teacher leadership ($r = .44$, $p < .01$). Similarly, a moderate and positive relationship was also found between work autonomy and perceiving the need for teacher leadership ($r = .43$, $p < .01$). These findings indicate that as the perception of work autonomy increases, teachers' levels of both demonstrating leadership behaviours and perceiving the need for such behaviours also increase.

On the other hand, a very strong positive correlation was found between the demonstration of teacher leadership and the perception of its necessity ($r = .97$, $p < .01$). This indicates that there is an almost linear relationship between the extent to which teachers demonstrate leadership behaviours and the necessity they attribute to these behaviours.

Overall, the presence of significant and positive correlations between the variables indicates that work autonomy is a construct closely related to teacher leadership and that the various dimensions of teacher leadership exhibit a strong coherence with one another.

3. Findings Regarding the Sub-Problem: Are teachers' perceptions of work autonomy a significant predictor of their perceptions of demonstrating leadership behaviours?

The findings regarding the third sub-problem of the study, "Are teachers' perceptions of work autonomy a significant predictor of their perceptions of demonstrating teacher leadership behaviours?", are presented in Table 3.

Table 3. *Regression analysis regarding the prediction of perceived teacher leadership by work autonomy*

Predictor Variable	Dependent Variable	ß	ShB	β	t	df	F	p	R	R^2
Work description	Fixed	1,708	.223		7,315	1	73,174	.000	.442	.195
	Demonstrating teacher leadership	.567	.066	.442	8,554	302				

Upon examining the results of the regression analysis in Table 3, conducted to determine the predictive effect of work autonomy on the demonstration of teacher leadership, it is evident that the established model is statistically significant ($F(1,302) = 73.174$, $p < .001$). It was determined that the work autonomy variable is a positive and significant predictor of the demonstration of teacher leadership ($\beta = .442$, $t = 8.554$, $p < .001$).

Upon examining the model's explanatory power, it is observed that work autonomy accounts for approximately 19% of the total variance in the demonstration of teacher leadership (R = .442, R^2 = .195). These findings indicate that an increase in teachers' perceptions of work autonomy has a significant and positive effect on their levels of demonstrating teacher leadership behaviours.

4. Findings Regarding the Sub-Problem: Are teachers' perceptions of work autonomy a significant predictor of their perceptions of the necessity of teacher leadership behaviours?

The findings regarding the fourth sub-problem of the study, "Are teachers' perceptions of work autonomy a significant predictor of their perceptions of the necessity of teacher leadership behaviours?", are presented in Table 4.

Table 4. *Regression analysis regarding the prediction of the perception of the necessity of teacher leadership by* work *autonomy*

Predictor Variable	Dependent Variable	ß	ShB	β	t	df	F	p	R	R^2
Work description	Fixed	.869	.294		2.955	1	71,164	.000	.437	.191
	Perceiving the need for teacher leadership	.704	.084	.437	8,436	302				

According to the results of the regression analysis in Table 4, conducted to determine the predictive effect of work autonomy on the perception of the need for teacher leadership, the established model is statistically significant ($F(1,302) = 71.164$, $p < .001$). It was determined that the work autonomy variable is a positive and significant predictor of the perception of the necessity of teacher leadership ($\beta = .437$, $t = 8.436$, $p < .001$).

Upon examining the model's explanatory power, it is observed that work autonomy explains approximately 19% of the total variance in the perception of the necessity of teacher leadership (R = .437, R^2 = .191). These findings indicate that as teachers' perceptions of work autonomy increase, their levels of perceiving teacher leadership behaviours as necessary also increase in a statistically significant and positive manner.

Conclusıon, Dıscussıon And Comment

According to the findings pertaining to the first sub-problem of the study, which aimed to reveal the effect of teachers' work autonomy on teacher leadership behaviours, the perception of work autonomy is above average. Based on this finding, it can be said that teachers believe they possess jwork autonomy in the schools where they work; generally, they feel they can plan their work and have the authority to make decisions regarding methods, objectives, programmes and time. Similarly, Tekben and Koşar (2025) also concluded that teachers' perceptions of autonomy regarding their profession are above average. Furthermore, according to Bakioğlu and Tan (2025), teachers' perceptions of autonomy were found to be at a moderate level; specifically, they felt autonomous in matters of curriculum and professional development. Similarly, Akci (2025) concluded in his study with teachers that their perceptions of autonomy were above average. According to the OECD (2016) report in Turkey, teachers feel autonomous regarding classroom-related matters such as teaching practices, the methods and techniques to be used, and assessment and evaluation practices. In this context, it can be stated that the findings largely align with results reported in both national and international literature, indicating that teachers perceive themselves as relatively more autonomous, particularly in areas relating to classroom practices.

When examining the findings regarding the extent to which teachers demonstrate leadership behaviours, it is observed that teachers believe they exhibit these behaviours. The findings reveal that leadership behaviours are demonstrated at the highest level in the organisational development dimension, followed by the professional development dimension; conversely, the dimension of collaboration with colleagues remains at a relatively lower level. Similarly, Güneş et al. (2022) found that teachers' perceptions of their demonstration of leadership behaviours were, in order, in the dimensions of organisational development, professional development and, finally, collaboration with colleagues. Andaya and Quinito (2025) noted that teachers demonstrate leadership behaviours; they stated that to overcome the challenges of guiding colleagues to achieve collaboration, mentoring and peer support systems must be implemented. These findings are consistent with those in the literature; they indicate that whilst teachers tend to focus their leadership behaviours more on the areas of organisational and professional development, various structural and interactional constraints may be at play in the dimension of collaboration among colleagues.

The findings indicate that teachers' perceived necessity of leader teachers behaviours is above average, and they evaluate these behaviours as important

and necessary in terms of their professional practice. Teachers value teacher leadership and the demonstration of these behaviours, considering them necessary. Hıraoğlu and Hıraoğlu (2023) found, as a result of their case study research, that teachers perceive leadership traits and skills as necessary. Similarly, Ağırman and Ercoşkun (2017) concluded that teachers believe leadership teacher behaviours are necessary. In our study, in terms of dimensions, the highest average level of teachers' perception of the necessity of leader teachers behaviours was observed in the organisational development dimension, whilst the lowest average was in the professional development dimension. Similarly, in the study conducted by Güneş et al. (2022), it was revealed that teachers had the highest perception of necessity in the organisational development dimension and the lowest in the peer collaboration dimension. In the study by Yılmaz, Oğuz and Altınkurt, participants indicated that, among the dimensions of leader teachers behaviours, the professional development dimension was perceived as the most necessary, whilst the institutional development dimension was perceived as the least necessary. On the other hand, in the study by Yiğit, Doğan and Uğurlu (2013), it was concluded that teacher leadership behaviours were deemed most necessary in the professional development dimension and least necessary in the peer collaboration dimension. It is assessed that the differences between the findings may stem from multi-dimensional factors such as organisational culture, the context in which the research was conducted, the participants' demographic characteristics (educational level, seniority, etc.), and their attitudes and beliefs regarding the profession and colleagues.

The second sub-problem of the study investigated whether there was a significant relationship between teachers' perceptions of work autonomy and their perceptions of demonstrating and perceiving the necessity of leader teacher behaviour. Findings regarding this sub-problem indicate that teachers' perceptions of work autonomy are positively correlated with their levels of demonstrating leader teacher behaviour and perceiving the necessity of such behaviour. Kara and Bozkurt (2022) concluded that there is a positive and significant relationship between teachers' perceptions of autonomy and teacher leadership, as well as the subdimensions of teacher leadership: organisational development, collaboration with colleagues, and professional development. They stated that these concepts are not independent constructs; rather, the perception of autonomy is one of the key factors influencing teacher leadership. Similarly, in her study, Çimen (2025) found a positive and strong relationship between teachers' levels of leadership behaviour and their perceptions of autonomy. Furthermore, Hoey (2025) stated that work autonomy enhances employees' leadership qualities, as well as leadership-related concepts such as motivation, organisational commitment, ownership of tasks, and a sense

of responsibility. In this context, it is assessed that teachers' perceptions of work autonomy are positively correlated with their levels of demonstrating and perceiving the necessity of leadership teaching behaviours, and that there is a significant interaction between these variables.

Findings regarding the study's third sub-problem revealed that teachers' work autonomy significantly and positively predicts leadership teacher behaviours. Kara and Bozkurt (2022) identified that teachers' autonomy is among the factors explaining teacher leadership. Consequently, they emphasised the need to encourage teachers' autonomy to bring out their leadership skills. Furthermore, Buyruk and Akbaş (2021) concluded that teachers' autonomy predicts teacher professionalism, which includes teacher leadership. Within this framework, the findings indicate that teachers' work autonomy significantly predicts leadership teacher behaviours and suggest that autonomy may be an important factor supporting teacher leadership.

According to the study's final findings, the work autonomy variable is a positive and significant predictor of the perception of the necessity of teacher leadership; it can be stated that as teachers' perceptions of work autonomy increase, so too does their level of perceiving teacher leadership behaviours as necessary. One of the factors influencing teacher leadership is distributive leadership in schools (Kurt, 2016). Accordingly, leadership does not remain solely with the school administrator; teachers are given the opportunity to demonstrate leadership behaviours. In this context, Ertük et al. (2025) found in their research that teachers' autonomy is associated with distributive leadership in a moderating sense. Consequently, when teachers are autonomous, they may perceive leadership behaviours as necessary. Furthermore, in his study, Demir (2023) demonstrated that teachers' autonomy predicts motivation, which is one of the components of teacher leadership. On the other hand, Hayslip (2023) argued that teachers' perceptions of autonomy are related to concepts associated with teacher leadership, such as motivation, belonging, school commitment and competence. When all these findings are evaluated together, a significant relationship has been established between teachers' work autonomy and the extent to which they perceive leadership behaviours as necessary. However, the literature emphasises that other contextual and individual variables not addressed in this study (e.g. motivation, organisational culture and managerial factors) may also influence this relationship. Based on the research findings, the following recommendations have been made:

• Policy-makers responsible for education policy can raise awareness among school leaders and teachers regarding professional autonomy. By taking

the concept of professional autonomy into account, school leaders can grant teachers greater scope for professional autonomy.

• By creating environments where exemplary teacher behaviour can emerge within educational institutions, educators can be encouraged in this regard.

• Qualitative research could be conducted to explore the underlying reasons for the findings of this study in greater depth.

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